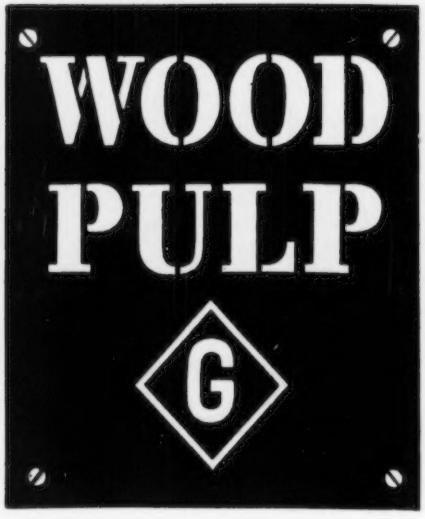
Paper TRADE JOURNAL

JULY 13, 1950

HOW MUCH DO YOU LOSE BY DETERIORATION OF PULPWOOD IN STORAGE?

CAN HIGH SPEED PHOTOGRAPHY HELP YOU PREVENT EQUIPMENT BREAKDOWNS?

WHAT DO THE NUMEROUS SMALL SHUT-DOWNS OF YOUR LIME RECOVERY SYSTEM ADD TO YOUR COSTS?



Established 1886

"Time ripens all things. No man is born wise."

CERVANTES

Organizations are the lengthened shadows of the men who make them up; and organizations, like men, learn and build through the years.

With changing times and conditions, with a constant succession of new problems met and solved, they accumulate knowledge and experience of solid, practical value.

Sixty-four years of intensive and extensive working with the Pulp and Paper Industry have equipped us to serve you well.

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— INCORPORATED —

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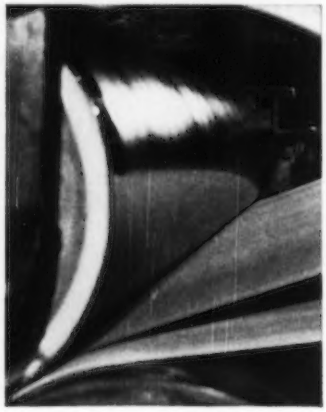
Efficient water removal means:

- Longer Felt Life
- Less Down-Time
- Increased Production
- Greater Profits

In one mill after another, Downingtown Suction Press Rolls have proved that vertical water removal pays off in longer felt life, less down-time, and higher machine speeds. Plain press rolls extract the water horizontally, forcing it back through the web of paper and the felt, against the direction of the run. This disturbs the formation, and tends to fill up the felt. Mill data show clearly the advantages of the suction method.

For example, before a recent installation on a Harper-type Fourdrinier, the top speed on 12-13 lb. napkin stock was 450 FPM, because crushing and pin holes developed at the press when this speed was exceeded. A 22-inch rubber-covered Downingtown Suction Press Roll permitted operation at 700 FPM, and gave a 90% increase in felt life. No other changes or additions were made to the machine. Forming and drying capacities limited the speed to 700 FPM—not press capacity.



Efficient vertical water removal shown by absence of water at incoming side of press

In another mill that is producing facial, a Downingtown Suction Roll allowed a speed increase from 700 to 1200 FPM. Again press was not the limiting factor. Prior to the installation, felts had to be washed three times each 24 hours. Felt life average was seven days. Since installation, no washing of felts during runs is required, and felts now average 16 days, a life increase of well over 100%, at an increase of 70% in speed.

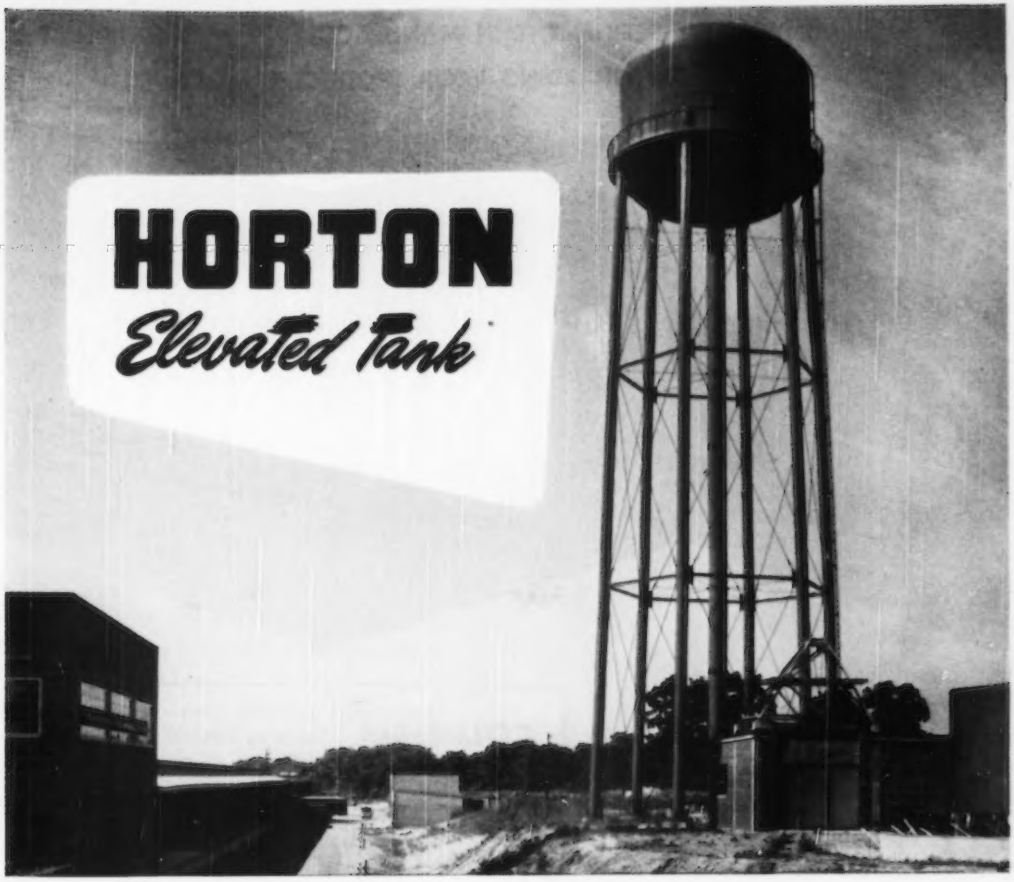
These are not exceptional cases, but are exactly the kind of results you can expect in your mill. We'd like to tell you more about Downingtown Suction Press Rolls and the rest of our complete line of suction equipment. Write us.

DOWNINGTOWN MANUFACTURING COMPANY

DOWNINGTOWN, PA.

Pacific Coast Representative: JOHN V. ROSLUND, Pacific Bldg., Portland 4, Ore.

DESIGNERS AND BUILDERS OF PAPER AND BOARD MAKING MACHINERY SINCE 1880



Essential partner on your fire protection team

A HORTON elevated tank and an automatic sprinkler system are a dependable team when it comes to protecting your plant against fire. They start to fight back just as soon as a fire breaks out, before it has a chance to spread. They go to work at the heart of a fire, where fighting is most effective, and which often cannot be reached by any other fire-fighting method. A sprinkler system backed by an elevated tank may mean the difference in your plant between a few minutes' interruption and a costly shutdown.

Horton ellipsoidal-bottom elevated steel tanks are built for use with automatic sprinkler systems and for general industrial service in capacities from 15,000 gals. to 500,000 gals. Of butt-welded steel construction, they are smooth, graceful structures which are economically maintained. All parts of the tanks are accessible for inspection and painting.

Why not let this team protect your plant? We shall be glad to submit a quotation on the elevated tank, without obligation to you. Write our nearest office, stating capacity required, location where tank is to be erected, height to bottom, and type of insurance you carry.

The Horton elevated tank shown above is located at the United Wallpaper plant at Montgomery, Illinois. It is a 150,000-gal. structure, 100 ft. to bottom. The upper 50,000 gals. of the tank capacity is available for general service, and the lower 100,000 gals. is held in reserve at all times for fire protection. The entire plant is protected by the sprinkler system.

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Meticulous care in production and shipping makes Columbia Caustic Soda a high grade, dependable product . . . ideal for your most exacting use.

Columbia's patented purification process is a unique method which converts diaphragm cell electrolytic liquor to Caustic Soda of exceptional purity.

This purity is maintained throughout loading, transporting, and delivery . . . your assurance that Columbia Caustic Soda will always meet your requirements. Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Pennsylvania.

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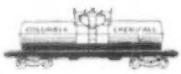

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FEATURES

	Page
Jeopardizing Paper Industry	13
Jack Pine Pulpwood Deterioration in Yard Storage	16
High Speed Photography in Paper Mill Maintenance	22
Practical Art of Color Matching on Paper	24
Engineering Management in the Lime-Recovery Plant	30
New Service—Paper and Pulp Testing Laboratories	37

DEPARTMENTS

Trends	7	Imports	41
Our Business	9	Materials	41
News of the Week	11	New Literature	42
Industrial Section	16	Forestry News	44
Patent Abstracts	35	Obituaries	44
Suppliers	38	Production Ratio Report	45
Financial Record	39	Classified Advertising	46
Prices	40	Index to Advertisers	58

DATES TO REMEMBER

SEPTEMBER 5-9: Sixth National Chemical Exposition, Chicago Section, American Chemical Society, Chicago Coliseum, Chicago, Ill.

SEPTEMBER 11-23: 6th Educational Graphic Arts Exposition, International Amphitheatre, Chicago, Ill.

SEPTEMBER 14-16: Southern Paper Trade Assn., Sheraton Plaza Hotel, Daytona Beach, Florida.

SEPTEMBER 14-17: American Pulp & Paper Mills Supts. Convention, Ottawa, Ont., Canada.

OCTOBER 2-5: Fifth Engineering Conference of the Pulp and Paper Industry, Netherland Plaza Hotel, Cincinnati, Ohio.

OCTOBER 16-20: 38th Safety Congress and Exposition, Chicago, Ill.

OCTOBER 23-25: National Paper Trade Assn., Fall Convention, Stevens Hotel, Chicago, Ill.

OCTOBER 30-31 NOVEMBER 1: 37th National Foreign Trade Convention, The Waldorf-Astoria, New York, N. Y.

NOVEMBER 27—DECEMBER 2: 19th National Exposition of Power and Mechanical Engineering, Grand Central Palace, N. Y.

DECEMBER 3-6: American Institute of Chemical Engineers, Annual Meeting, Neal House, Columbus, Ohio.

THIS WEEK

Pulpwood deterioration in storage can cause serious reduction of pulp strength. The findings of T. A. Pascoe and T. C. Scheffer in their article "Jack Pine Pulpwood Deterioration in Yard Storage" may help to reduce these losses.

A new tool to help paper mill engineers prevent equipment breakdowns is described in "High Speed Photography in Paper Mill Maintenance" by John H. Niemeyer.

A valuable contribution to the art and science of color matching, Read "Practical Art of Color Matching on Paper" by F. O. Sundstrom and E. I. Stearns.

The cumulative cost of numerous small shut-downs of a lime recovery system often is unnoticed by mill management. Ralph H. Gibbs in his article entitled "Engineering Management in the Lime Recovery Plant" points out the importance of eliminating this down-time.

NEXT WEEK

Analysis of Pulp & Paper Industry and the Raw Material Supply, by Klaus G. Scheye.

Use of Polyethylene as a Paper Coating, by L. W. Burgess.

Paper in Western Union Operations, by W. N. Enger.

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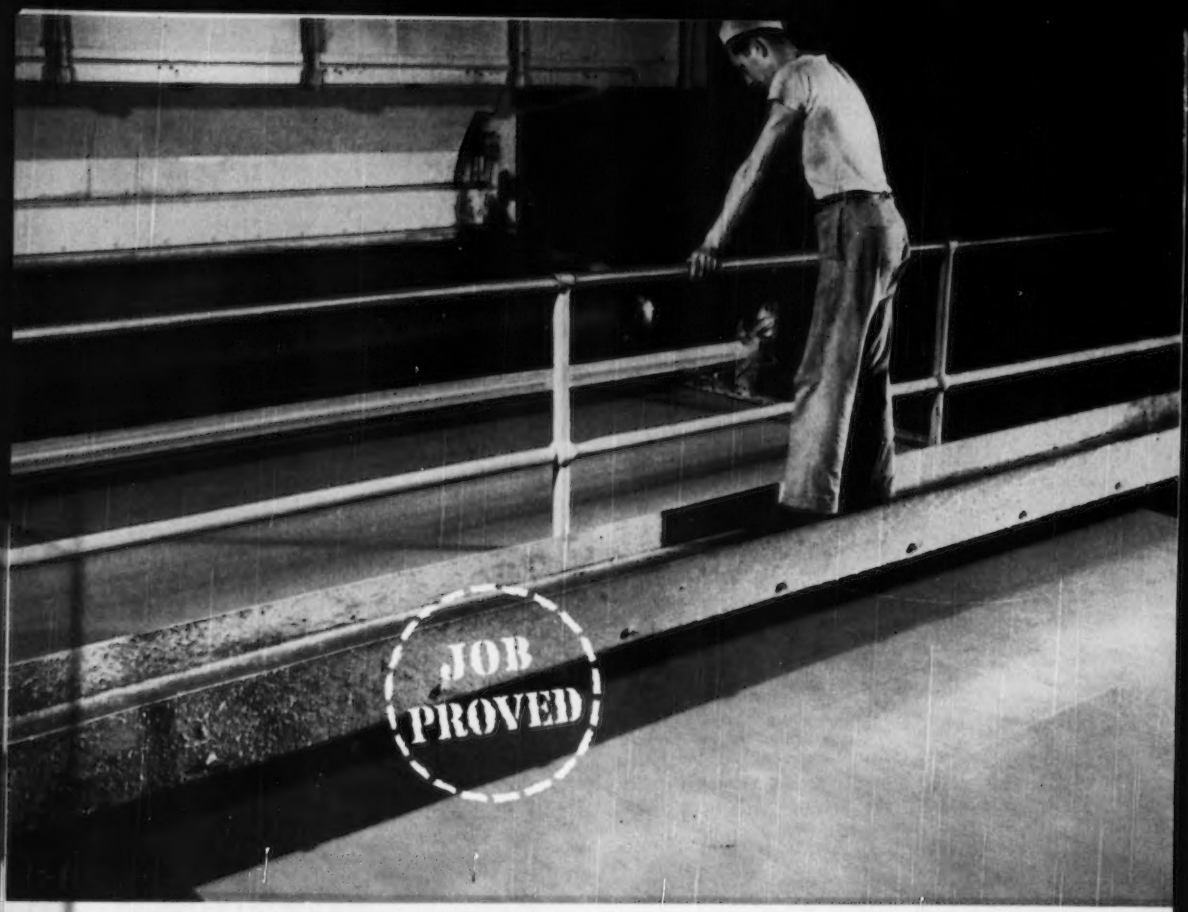

NOW USES 50% LESS GREASE

Switch to Sun Paper Mill Bearing Grease
Also Increases "Production Insurance"

The Fourdrinier shown above produces 1,500 feet of paper stock per minute. Running 7 days a week, it turns out over 8 tons of paper an hour, 24 hours a day. To such high-speed operation add the fact that many wet-end bearings are completely submerged, others have water constantly flowing over them. A tough lubrication problem. But one that Sun solved successfully more than 10 years ago.

Originally, this papermaking machine was lubricated with an expensive wet-end grease that performed fairly well. However, under the difficult operating conditions, it did not remain in the bearings; and they had to be filled twice a week. Since continuous operation was vital to the plant's entire production, management was eager to find a product with greater ability to "stay on the job."

A Sun representative was asked to make recommendations, and the "Job Proved" paper mill bearing grease he specified was given a trial. It stayed in the bearings longer, doubling the time between fillings. Furthermore, its greater oiliness provided an extra margin of insurance for the plant's production. For 10 years now, it has helped protect this two-million dollar machine—with a substantial bonus in the form of reduced lubrication costs.

Are there similar opportunities for better "production insurance" in your plant? A Sun representative will be glad to help you find out. Just get in touch with the nearest Sun Office. No obligation, of course.

SUN OIL COMPANY • *Philadelphia 3, Pa.*
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SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO®

Paper TRADE JOURNAL

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, July 12, 1950.

Judging by every newspaper, magazine and radio talk of the past week, it is the self-assumed obligation of every columnist to put himself in black and white on "the Korean situation." It could be that editorial policy requires an up-to-the-minute report. Or it may be that one must think for those who want pre-cooked victuals. Perhaps the columnist feels he must grasp the opportunity to influence public judgment. In the humid languor of New York's mid-summer, one could wish that if writers must take themselves so seriously, they would coolly evaluate all news reports and give some facts which can be accepted by the intelligent. The clean page should be put to good use when the world faces a crisis in its civilization. And there is a world shortage of newsprint.

The Market and War Talk

Contrary to daily press reports, there isn't much war talk or hysteria in market discussions. The industry knows well the unique place of paper in war service. It needs no reminder that an important portion of its market pulp is in jeopardy and could again be cut off completely. It remembers too well OPA, WPB, etc., ad nauseam. Should the UN "policing action" in Korea develop tragically into a major engagement, the industry is keyed to respond. Today, however, it has *today's* problems which are "sufficient unto the day." There is a stability in the industry which doesn't scare easily.

Wood Pulp Supply

There's no doubt about the extremely tight condition of market wood pulp. As has been reported in this column, the mills are caught short of bleached sulfite by the West Coast strike, a foregone conclusion in view of low inventory position at many consuming mills. The natural flow of supply has been interrupted; mills have had to borrow from nearby mills.

The industry has not been thrown by this misfortune yet, however. Thus far no mills have been closed by the strike. Currently many are still shut down for vacations and for repairs, a lull which will help the stock position. Should the trouble continue, there is some likelihood of production cutbacks, conceivably to the extent of a day or so a week. No complete shutdowns are in the cards.

Reports in the press that mills are rushing to build pulp stocks in face of the war threat are merely words. Most mills have their contract supply keyed to current capacity. It would be desirable if they could add to inventories, but there is no avenue of supply. The market is sold up. The Scandinavian supply is under contract. The Swedes are understood to be buying pulpwood from Finland to stretch their own supply. Conditions are ripe for a premium spot market.

Talk about "gray and black markets" in pulp has no basis in fact, unless one becomes careless in the use of words. There is no illegal trading or pricing in wood pulp today. Some spot trading at premium prices is reported; and more is likely to develop as shortages become more acute. Premium-priced lots have a way of materializing on such a market. Bleached sulfite at $175 is spoken of as a probability.

Also indicative of advantageous conditions for spot trading are reports that more southern unbleached kraft is being offered, and at higher prices than $95 delivered. But when one hears of 500- to 1000-ton lots of European primes, at $110 on dock, begging for buyers, he knows the mills aren't hysterical yet.

Paper and Board Prices

Other inaccurate press reports relate to prices of paper and paperboards. As reported earlier in *Trends*, there has been indication that prices of the finished product would trend upwards with those of pulp, chemicals and labor, probably 4 to 6 percent. The delay in publishing actual prices has been due to trade conditions. This is no war scare. So competitive is the market that producers seem to hesitate about passing along the increased costs. Those not dependent on the market for wood pulp — the integrated segment — have less reason for a rise.

Kraft.—No scent of price increases for kraft wrapping and bag paper, kraft board, liners, etc., was in the wind at press time.

Pre-vacation operation at unbleached kraft mills was reported at 97.9 percent of rated mill potential, with the major increases in liners, corrugating materials and shipping sack paper. (See Table for April figures.)

Tissues.—Tissues, napkins, glassines, etc., which require specialty grades of Scandinavian pulps are most sharply hit by rises in third-quarter pulp prices.

On the sharply competitive napkin market, the small non-integrated producer has new troubles.

COARSE PAPER PRODUCTION, APRIL, 1950

(Tons of 2,000 pounds)

	April 1950	March 1950	April 1949
Coarse paper, total	271,618	300,675	218,205
Glassine, greaseproof, and vegetable parchment	11,942	12,483	8,822
Wrapping, total	77,060	81,522	67,019
Unbleached kraft	41,469	44,911	34,680
Other	35,591	36,611	32,339
Bag, total	57,609	64,538	50,543
Unbleached kraft	52,160	58,023	47,019
Other	5,449	6,515	3,524
Shipping sack	49,164	57,408	32,820
Converting, total	75,843	84,724	59,001
Unbleached kraft	38,196	45,975	30,503
Other	37,647	38,749	28,498

Source: Bureau of the Census.

The wrapping tissue mills are enjoying a healthy volume of business in preparation for what now appears to be an upswing in general soft goods buying, following a cycle of heavy, long-term purchasing of refrigerators, automobiles, television, washing machines, etc. In the face of increased cost of pulps and other raw materials, most mills have withdrawn their price-lists. Pending reissuance, billing is at price prevailing at time of shipment. Thus no actual price range on wrapping tissues is currently obtainable. The prices reported on *Prices* page have been withdrawn.

Writing and Printing Papers, etc.

An indication of the current range of bonds, ledgers and book papers is given on *Prices* page. *Rag contents* are unchanged to date. On the sulfites, not all mills have lifted prices. It appears that a rise of 7 to 10 percent is effected on writing papers, and of 5 to 7 percent on *book*. The range is broad and competitive, and complete coverage is not yet possible. Business is reported as steady and good for the slow Summer season; inventory is about normal, not heavy.

Paperboards. — Some price rises in boards at $5 a ton are reported. In the New York area, increases are reported for plain chip, filled and solid news, bleached and single manila lined chip, and white patent coated. Midwest mills are reporting across the board rises for all boxboards to cover increased labor costs amounting to $2.50 per ton, also pulp and waste paper rises. Demand is unusually good and looks strong.

Materials

Chlorine, Soda Ash. — Supplies are extremely tight. Strike continues at a major supplier.

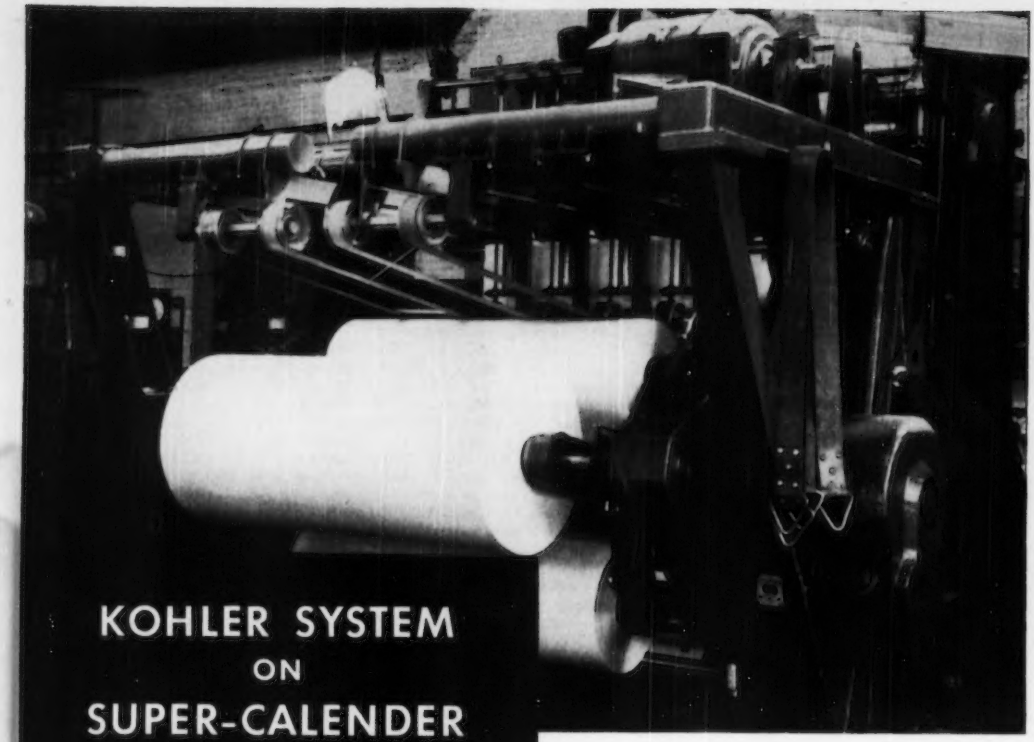
Casein. — Demand better; supply lighter. Prices of domestic and imported stronger by ½ to 1 cent.

Rosin. — Demand and inquiry good. Price strengthens 19c on H, I, K grades.

Paperboard Production (Tons)*

	July 1 1950	June 24 1950	July 2 1949	Month of June
Production	211,058	211,027	153,817	846,030
New Orders	220,204	208,738	161,576	855,016
Unfilled Orders	394,110	390,879	243,297	394,110

Source: NPA.



KOHLER SYSTEM ON SUPER-CALENDER

The Kohler System—combination unwinding and winding reel—on a super-calender at a northern coating mill, should arouse the interest of other mills operating super-calenders.

This equipment assures constant uniform tension. It eliminates down time due to loading and unloading. It has brought about a reduction in "snap offs." It has very substantially increased production.

Operating Procedure

The reel unwinds from the upper (rear) position under control of the Kohler running belt tension. The calendered web is rewound on the bottom (rear) position under control of the winder motor mounted above the machine.

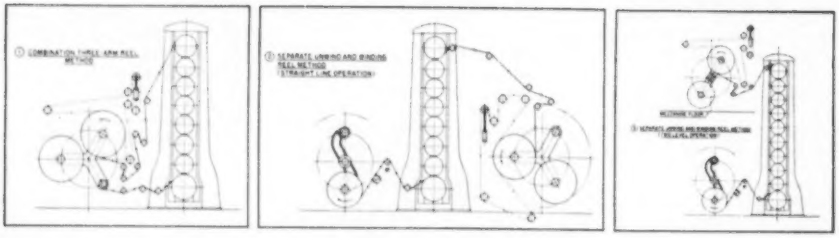
Unloading of calendered rolls and loading of uncalendered rolls take place at the front position by means of an electric hoist and while the stack is running. Roll cores are chucked in ball bearing spindles without the use of shafts.

While the stack is operating, splice is prepared on the fresh roll, which roll is pasted at threading speed to the expiring web. A momentary stop is then made to strike over the winding web to the core of the roll just exhausted. Time—a matter of seconds instead of the several minutes usually required.

Kohler System combination unwinding and winding reels are in service on a number of super-calenders—at paper mills and converting plants.

For more complete data write—

DILTS MACHINE WORKS, Fulton, N.Y.



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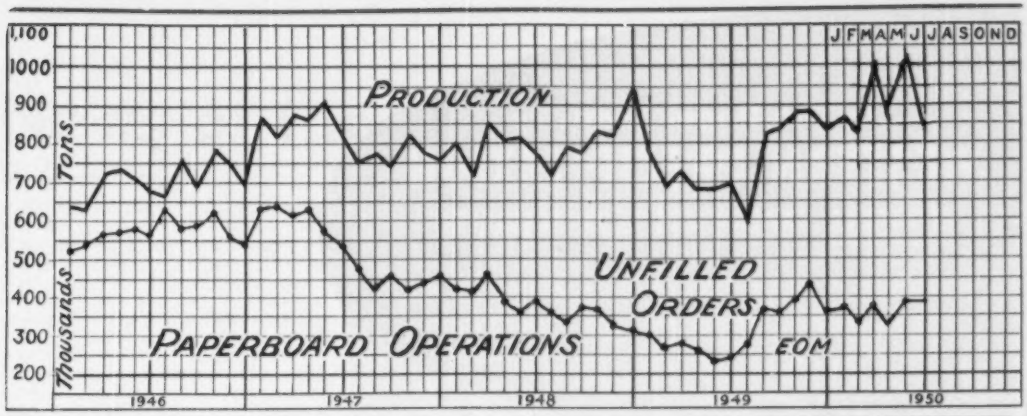
OUR BUSINESS



Source			WEEK ENDING July 1, '50	June 3, '50	July 2, '49
APPA	Paper Production percent 6-day Capacity		104.5	97.8	77.5
	Unbl. Kraft Paper Production percent		97.9	95.8	66.0
NPA	Paperboard Operating Ratio percent inch hours		94.0	83.0	75.0
			May 1950	**Apr. 1950**	**May 1949**
APPA	Paper Production* (Except Newsprint and Building Papers)	Tons	842,500	776,768	639,482
	New Orders	Tons	836,000	780,149	629,197
	Unfilled Orders	Tons	535,065	541,593	342,763
	Shipments	Tons	842,000	773,111	634,219
			June 1950	**May 1950‡**	**June 1949**
NPA	Paperboard Production	Tons	846,030	1,031,369	696,800
	New Orders	Tons	855,016	1,091,175	692,000
	Unfilled Orders	Tons	394,110	395,483	243,300
	Our Customers Activities Index[1]		**Latest Mo.°**	**Previous Mo.°**	**Year Ago°**
FRS	Manufactures Total Index		197	191	183
	Durable Mfg. Index		222	210	212
	Nondurable Mfg. Index		177	176	159
	Chemical Products Index		252	250	239
	Mfg. Food Products Index		148	148	148
	Printing and Publishing Index		175	172	157
ODC	Magazine Advg.-Printer's Ink Index		327	328	346
	Retail Sales Combined Adjusted Index		309.6	308.1	304.5
	Drug Index		221.2	221.3	229.8
	General Merchandise Group Index		293.3	291.8	288.3
	Grocery and Combination Index		378.6	377.3	366.3
	Prices Index				
BLS	Consumers Price Index[1]		167.3	167.0	169.7
	Wholesale all Commodities[2]		152.9	152.7	156.9
	Wholesale Foods[2]		155.3	155.5	162.9
	Commodities other than Farm Products and Foods[2]		146.4	146.1	148.9
	Wholesale Pulp and Paper[2]		155.4	155.5	165.1
	Purchasing Power of Dollar, Consumers Prices[1]		59.8	59.9	58.9
	General Activity Index				
FRS	Mfg. Production-Worker Payroll		333.5	329.9	319.2
	Unemployment Compensation Initial Claims (M)		1,543	1,294	1,800
	Miscellaneous Carloadings–Thousands of Cars		1,434	1,688	1,381
	Electric Output (Million KW hr.)		30,191	31,864	27,745
PTJ	Average 32 P & P Common Stocks as of July 3		$31.39	$34.16	$24.75
	Average Indicated Dividends Common Stocks as of July 3		$ 2.32	$ 2.32	$ 2.20

[1] 1935-39=100 Unadjusted Index
[2] 1926=100
* For details see APPA Monthly Statistical Summary—May 1950 Estimated Figures
° Latest Month Available on Request
‡ For Five Weeks

In The Paper Industry

WESTERN PRECIPITATION

COTTRELL EXPERIENCE IS UNEQUALLED

– Because Western Precipitation *pioneered* the first COTTRELL Installation in a Paper Plant!

In the design and installation of COTTRELL Electrical Recovery equipment there is no substitute for *experience*. And it is important to remember that the Western Precipitation organization not only pioneered the first successful COTTRELL installation made in *any* industry, *but also pioneered the first* COTTRELL *installation made in the paper industry.*

This installation, made over 30 years ago, blazed the trail for use of COTTRELL equipment for recovering dust and fume from black liquor furnace gases in modern paper plant operations.

Let us show you how Western Precipitation's consistent leadership in COTTRELL "know-how" assures you the most modern advancements and the most economical operations in YOUR electrical recovery operations.

◀ *Western Precipitation knows* COTTRELL *equipment as no other organization does, having pioneered the first commercial application of* COTTRELL *equipment made in any industry!*

◀ *Western Precipitation knows* COTTRELL *applications in paper operations because its widespread experience in this field dates from the pioneer* COTTRELL *installation made in the paper industry!*

◀ *Western Precipitation is able to give you an unbiased recommendation on your recovery requirements, for in addition to leadership in the electrical recovery field—Western Precipitation also leads in the mechanical recovery field with its widely-known* MULTICLONE *Mechanical Collectors. Western Precipitation installed the first MgO plant.*

Regardless of the size or nature of your dust or fume recovery application, let us study your requirements and make an unbiased recommendation based on over 30 years experience in the paper industry. Call, write or wire our office nearest you.

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News of the Week

Expand Research Activities

MONTREAL, Que.—"The appointment and first meeting of the new board of directors of the Pulp and Paper Research Institute of Canada emphasizes the intention to expand the research activities, and the graduate training program carried out in collaboration with McGill University and now under way at the Institute. It is a practical indication of the increasing support given the Institute by its sponsors, the pulp and paper industry, the Dominion Government, and McGill University," said R. L. Weldon, president, Bathurst Powder and Paper Co., Ltd., Montreal, and newly elected chairman of the Institute's board, following the first meeting of the board here recently.

"Research is the foundation and lifeblood of industrial progress," continued Mr. Weldon. "Hence the sponsors of the Institute are intensifying its activities in the fields of fundamental and applied research. We expect also to expand its facilities for the studies of post graduate students in a variety of fields, and thus provide an increasing flow of technical and scientific personnel with advanced training in engineering, chemistry, and allied subjects from the university to industry."

Following the granting of a federal charter to the Institute, a new board of directors was constituted to replace the Joint Administrative Committee, composed of representatives of the industry, the Dominion Government, and McGill, and of which Mr. Weldon was also the chairman.

To the new board, the government has appointed Dr. H. L. Keenleyside, deputy minister of Resources and Development, and D. A. Macdonald, director, forestry branch, Department of Resources and Development, Ottawa. McGill University has appointed Dr. F. Cyril James, principal and vice-chancellor of the university; B. C. Gardner, president of the Bank of Montreal; and S. G. Dobson, chairman of the board, the Royal Bank of Canada, Montreal. In addition to Mr. Weldon, the industry has named D. W. Ambridge, president, Abitibi Power and Paper Co., Ltd., Toronto, and S. L. de Carteret, president, Canadian International Paper Co., E. H. Smith, president, Howard Smith Paper Mills Ltd., R. M. Fowler, president, Canadian Pulp and Paper Assn., and Dr. L. R. Thiesmeyer, president of the Institute, all of Montreal.

Starting 21 years ago on McGill's campus, the Institute today enjoys a world-wide reputation as a leading training center for research in fields of cellulose chemistry and other subjects pertinent to problems of the industry. Its work covers many aspects of pulp and paper from forest to finished product. Its woodlands research program includes studies in such things as silviculture, logging, and fire prevention methods. Manufacturing processes such as the pulping of various tree species, and the use of waste materials are also investigated. The Institute has also undertaken considerable research on the structure, behaviour, and use of cellulose fibers, the nature of lignin, and other kindred subjects.

Under its auspices many graduate students have been trained for careers in pulp and paper, forest products, and allied industries.

New board of directors of the Pulp and Paper Research Institute of Canada located on McGill's campus, Montreal, seated left to right: Dr. L. R. Thiesmeyer, president of the Institute; R. L. Weldon, newly elected chairman of the Institute's board and president Bathurst Power and Paper Co., and S. L. deCarteret, president, Canadian International Paper Co.; standing left to right, L. P. Fournier, secretary-treasurer and comptroller of the Institute; F. L. Mitchell, manager, Canadian Pulp and Paper Assn.; R. M. Fowler, president Canadian Pulp and Paper Assn.; Dr. F. Cyril James, principal and vice-chancellor of McGill University and S. G. Dobson, chairman of the board. The Royal Bank of Canada, all of Montreal.

84 Year Old Franklin Paper Closes

HOLYOKE, Mass.—Exactly 84½ years after its establishment, the Franklin Paper Co. ceased operations the first of the month with a resultant layoff of 60 workers. No plans have been made for the disposal of the mill property, according to Robert M. Swaney, 131 Lincoln street, president, treasurer and general manager.

The mill will not, however, resume manufacturing as Franklin Paper Co., and it is presumed that it will be sold as a going concern if possible, and if not, that it will be liquidated.

The company is free of funded debt and in a completely solvent condition, Mr. Swaney explained. In fact, the mill has been running recently in the black and on full time, producing about 15 tons a day on its papermaking machine.

Mr. Swaney, who said he would personally prefer to see the mill bought and operated by a responsible company, said the stockholders gave the management authority to cease operations because during the past couple of years the company had been operating at a loss and the prospects for long-range profitable operation were not bright. He explained that profitable operation of an independent one-machine mill of this type has been made most difficult by the competition of larger and faster paper mills in the South and by the operations of large integrated mills (paper mills that also make their own pulp).

Accordingly, it was considered impossible to operate the Franklin profitably, in the long-range view, with the accompanying burdens of overhead and increasing production costs.

The mill, manufacturer of printing bristols, index bristols and board specialties, was founded on January 2, 1866, by James H. Newton of Holyoke and Calvin and Samuel N. Taft of Worcester, and the mill was built on the third level canal, north of the canal overflow. It has the benefit of two railroad sidings and of permanent water power from the canal.

In the early eighties the company was acquired by the Ramage family,

which has been allied with the Newtons in mill enterprises here and at Monroe Bridge. It was operated by James Ramage, later by his sons, James M., Robert, Theodore and Charles, still later by James Ramage, son of Charles, who was its manager from 1926 to 1940.

The late George Watson, although not actually manager of the mill, was its president and treasurer for many years. In 1948, after Mr. Watson's death, Mr. Swaney became head of the company, having been mill superintendent from 1941. Other officers of the company are: vice-president, Keith Fletcher; assistant treasurer, Arline M. Chadwick; and clerk, Kai Kjoller. The stockholders, of whom there are 15, are nearly all members of the Ramage family.

K. C. Plans $2 Million Expansion

NEENAH, Wis. — A plan to increase the operation of Kimberly-Clark's Memphis, Tenn., plant by more than 50 percent and at a cost in excess of $2 million has been announced by Ernst Mahler, executive vice-president. The expansion will be completed in about a year.

Plans are being made for the installation of a third creped wadding machine for the manufacture of such trade-name products as Kleenex, Kotex and Delsey.

Actual work on the project is expected to start within 60 days. Several building changes will be required to accommodate the new machine and auxiliary equipment, plus additional converting machinery.

Kimberly-Clark purchased the plant, formerly used to produce aircraft engines, in 1946. The first of two large wadding machines was placed in production late in 1947.

Maclaren Expansion Program

OTTAWA — James Maclaren Co., of Buckingham, Que., headed by C. H. Maclaren, has commenced building at Masson, Que., a further major unit in a plant extension and improvement program that will cost approximately $2 millions with equipment. The contractor is the Foundation Co. of Canada.

Contract awarded is approximately $560,000 for grinder room, four stories, steel and brick; fire protection system; installation of equipment and auxiliary services.

New Duncan Bay Mill

DUNCAN BAY, B. C. — A $25 million pulp mill will be built in British Columbia, Premier Byron Johnson announced here. The fourth pulp mill in the province will be located on a 200-acre site and will not become a camp town. Premier Johnson said the mill has been given a forest management license with a stand of 125,000 acres. Construction of the mill will begin this summer.

Holiday Homemakers are advised on all-paper service for happier summertime entertaining during television program over WNBT, New York. Shown discussing luncheon cooked and served in paper containers, with paper napkins and tablecloth to cut kithchen chores to minimum, are (left to right): Ann Pringle, mistress of ceremonies, WNBT's "Just for You" program; Margery Link, Lily-Tulip Cup Corp.'s representative, and Carl Caruso, male m.c. of the popular daily guest program beamed to nearly a million video sets in the New York area. Chicken pie and muffins cooked and served in paper containers, and salad, ice cream and hot and cold beverages served in Lily cups, comprised the menu.

American Writing Adds Machine

HOLYOKE, Mass.—An additional machine is going into operation at the Crocker division of the American Writing Paper Corp. and will specialize in lightweight sulfites.

This will bring the total of machines in operation at the Eagle A mills to 10. This particular machine has been down for several years. Much renovation work has been done on it and now some manifold, onion skin and lightweight sulfites are being run off. The finishing work on the machine will be completed during the fortnight shutdown in July and when the mill reopens the machine will be ready for full production.

It is a machine of 67-inch trim and will be the third one running at the Crocker division.

Provincial Adds Machine Coated Unit

OTTAWA — With the domestic and export demand for its products warranting such action, a second unit for the manufacture of machine-coated paper at Provincial Paper Ltd., Port Arthur, Ont., is being installed this month. It is expected to about double Canada's output rate of such paper. Decision to install the machine has been made last fall since the original unit was unable to meet all the demands for this type of paper.

When the new unit was first planned, the cost was estimated to be approximately $375,000.

Walker Controller of Brown Corp.

BERLIN, N. H.—Laurence F. Whittemore recently announced the election of A. B. Walker as Controller of Brown Corp. Mr. Walker assumed his new duties on June 26th.

May Sell Paper Corp. of America

CHEBOYGAN, Mich. — A foreclosure decree providing for auction sale of the Cheboygan Paper Mill plant and property unless the Paper Corp. of America makes up overdue payments on a mortgage by October 12 was signed by Circuit Judge Ward I. Waller.

Murray Landy, of New York, who asked the foreclosure, said default of payments make the mortgage and a note totaling $2,550,000 now due.

Interest on the note was computed at two percent.

Badger Gets Supercalender

PITTSBURGH, Pa. — A new drive for installation on a 72-inch-wide supercalender which will produce a double finish on waxed paper at pushbutton-controlled speeds up to 1600 feet per minute, with a threading speed of 50 feet per minute, has been ordered from Westinghouse Electric Corp. by the Appleton Machine Co., Appleton, Wis. The supercalender will be installed at the Peshtigo, Wis., mill of the Badger Paper Mills, Inc.

Richmond Pulp & Paper In Operation

OTTAWA — The Richmond Pulp and Paper Co. mill at Bromptonville, Que., formerly the Brompton Pulp and Paper Co., has started operations to produce newsprint. So far the output is about 65 tons daily but this will be increased to approximately 100 tons daily within the next three months through modernization of existing equipment. Its annual capacity is likely to be about 30,000 tons or more, it is learned.

About 200 workers have been taken on by the mill with the resumption of operations.

Scouts Use Paper Tents

KAUKAUNA, Wis.—Most of the Boy Scouts attending the national jamboree at Valley Forge, Pa., slept in ordinary tents. The scouts from the Valley council were exceptions.

The boys from this area threw the conventional canvas aside and pitched specially designed paper shelters made right in their home community.

The Thilmany Pulp & Paper Co. provided eight of the shelters, shaped like small quonset huts, for the scouts. Made of strong, waterproof laminated paper, each shelter will house four persons.

The paper shelters fold into a small package. At the campsite they are unfolded and laid over branch frames obtained at the spot. In prejamboree tests it was found that it takes about an hour to put up one of the huts.

Unfolded and ready for service, the huts are 9 feet wide and 14 feet long. The center of the rounded roof is six and one-half feet high. Experiments here showed that the laminated paper will withstand wind and rain as well as the traditional tents.

Raimondo Gets Brazil Contract

SAO PAULO, Brazil—A contract to design and erect a $2 million paper mill at Sao Paulo has been let and construction is expected to start soon. The mill will produce paper from bagasse by a continuous process. Winner of the contract was Dr. G. Raimondo, a South African paper manufacturing technician.

MacMillan Location Named "Harmac"

VANCOUVER, B. C. — "Harmac" has been selected as the name for the location of the new pulp mill of the H. R. MacMillan Co. near Cedar, four miles south of Nanaimo. Company officials explain that as the mill was outside organized territory, a name was needed for the locale to establish it as a shipping point.

Keep It Up

The reaction of everyone in the Paper Industry to further tariff reductions has been swift and sure. Reports indicate that Congress has received a great number of protests. It is reported that one Senator has received over 700 letters.

Your representatives will be home soon. How about seeing them personally and giving them the facts? How about a trip through the mill—it will help them understand.

They are depending on You to get elected. Put it up to them that you are depending on them to stop this attack on your job.

Jeopardizing Paper Industry

This is what the Appleton, Wis. *Post Crescent* (circulation 26,703) says:

"In September at Torquay, England, it is presently proposed to make further room in the American market for foreign products, including practically every known kind of paper from cellulose wadding through filtering and cigarette papers down to various paper boards, combination sheets and envelopes and even "paper not specially provided for."

"There should be no confusion about the controversy which America faces since Administrator Hoffman of the Economic Cooperation Administration has conceded that the full effectiveness of the proposed agreement 'will mean unemployment in American industries which are unable to compete with foreign industries making comparable merchandise.' But announcement has been made that the rigors of unemployment and the hardships of displaced labor will be mitigated either by a special form of unemployment relief or a migration of the unemployed into other fields of employment. That might mean that paper mill workers in Wisconsin who appear to have steady, lifelong jobs, may be offered employment in plants building bombers or developing atomic fission, work that does not necessarily promise to be continuous.

"The paper industry is America's sixth in value of its products. It should not be jeopardized without a full and complete understanding by the people of the country, and particularly those directly interested, in the aim of the Washington regime and the curious way it is attempting to secure it.

"Present tariffs upon paper are very low. There is none upon newsprint. Going back to 1948 for the latest obtainable figures, we find that the total value of imports of all kinds of paper and pulp into this country was $710,000,000, of which nearly $700,000,000 was duty-free pulp and newsprint. The main, if not the exclusive, gainer by dropping the present tariffs upon certain paper products would be Canada. So the excuse that we want to furnish dollars to Europe has no application to this industry.

"But the harmful chain reaction of crippling our paper industry is more farreaching than most people from the comfort of their easy chairs will envision.

"First, there will be a blow to our scientific forestry industry. The usefulness of the 20 million acres of woodlands now under technical forest management designed to insure a constant crop of raw materials will be materially lessened. Present purchases of pulpwood from small land owners, who cut on their own woodlots, total $250,000,000 per year. That item will be endangered and may be lost. It is a valuable source of income to thousands of relatively small land owners across the country.

"Shrinking our paper industry is going to be a body blow at the railroads and railroad men. The transportation systems today bring in a tonnage to the paper mill that is estimated at about five times as great in the mass as the product shipped out. And the railroads will miss that tonnage.

"Paper mills are also important purchasers of coal and chemicals. Coal, in fact, moves up this Fox River all summer long. That coal is brought to Green Bay by great water carriers and in the winter by railroads.

"So far as we have gone it is obvious that shrinking the payroll at the paper mills will shrink the payroll somewhat in all industries dealing heavily with the paper plants.

"But when you lame a natural industry that has built itself up laboriously through the generations a wound of the spirit is inflicted in addition to the wound of the flesh. The productive capacity of our paper industry has been growing not only because the country is growing but because resourceful research departments have been finding new uses for the product. Instead, therefore, of new paper mills, construction in that line will probably be abandoned and the gigantic paper mill machinery that sometimes takes two or three years to construct will be abandoned, too.

"The purpose of taking away from our own paper industry the market which it has made for itself is inviting self-punishment and sacrifice without any possible offsetting gain.

"It is true that America far exceeds any nation in the world in industrial development. Human freedom was one of the prime factors that made this country great. But also that greatness was assured by our national encouragement of such industries as can create products at reasonable costs.

"Once upon a time—and this is not a bedtime story but rather a sad chapter in our history—we labored hard at Washington for what was called a Reciprocity Treaty. Reciprocity is a nice word. It implies mutual helpfulness. By our Reciprocity Treaty with Canada in 1913 we put newsprint on the free list. When we did so we had 70 newsprint mills in this country. Today we have 13. Did Canada put newsprint on the free list? Canada still levies a duty of 12½ percent on newsprint.

"Unfortunately the blow back there in 1913 was lightened by the war and so we missed a chance to learn a great lesson.

"The men that are playing with the delicate machinery of industry better watch their steps more carefully, that is unless we are to be forever at war."

Menasha Promotes Graebner

MENASHA, Wis.—Wm. H. Graebner was promoted to manager of the Central Production staff of the Menasha Mills waxed paper plant, it was announced June 23 by Roy J. Sund, vice-president in charge of manufacturing. Norm N. Foley, who has been with the company for over 30 years, succeeds Mr. Graebner as resident manager.

Mr. Foley has been employed in technical and manufacturing capacities, and was recently superintendent of the waxed paper converting unit and paper mill.

Whitten Elected Gair Director

NEW YORK — At a meeting of the board of directors of Robert Gair Co., Inc., New York, manufacturers of paperboard, folding cartons and shipping containers, Charles E. Whitten was elected a director. On June 3, Mr. Whitten was elected president and general manager of Gair Co. Canada Ltd., Toronto, a subsidiary of Robert Gair Co., Inc.

NEW ENGLAND-MAINE-NEW HAMPSHIRE TAPPI

Come and Get It at the Wentworth.

They've Got It! Lobster, Clams and The Fixins.

Al Bachman and Andy Jackson Get Ready for the Big Feed.

Diamond Match Changes

NEW YORK—Changes of status of five members of his staff have been announced by Victor R. Kendall, vice-president and director of sales of The Diamond Match Co. They are: Austin E. Smith has been appointed regional manager in charge of the company's Syracuse, N. Y., office. Until his promotion Mr. Smith had been handling special promotion of Diamond's paper products line in New York and New England.

Elmer E. Weeks, previously engaged in paper products promotion in the Middle Atlantic states, has been named as a regional manager with headquarters in the company's Washington, D. C., office.

J. Horace Chilton of the Washington office and Talbot D. Gittins of the Syracuse office have been transferred to the book match department. Mr. Gittins has been assigned to the West Coast, Mr. Chilton to Virginia.

Mr. Kendall announced that the company's regional office in Cleveland, O., has been closed and its territory allotted to the Chicago office. Ernest M. McHenry, Cleveland regional manager, has been shifted to the sales department of the B-F-D Division under its sales manager, E. B. Howard. Mr. McHenry will handle sales of the Foodtainer line comprised of assorted sizes of pulp trays for the prepackaging of meats, vegetables and fruit.

Form Foremen's Club at Deferiet

DEFERIET, N. Y. — Formation of a foremen's club at St. Regis Paper Co.'s Deferiet, N. Y., mill has been announced by D. A. Moran, resident manager. The club's activities are of educational and social nature.

Officers elected at the final organization meeting included: President, Robert Magruder, groundwood superintendent; vice-president, C. Wells Clark, coating superintendent; and secretary-treasurer, Wendell Dickaut, electrical superintendent.

Wesvaco Honors War Dead

TROY, N. Y.—A plaque honoring the memory of the 15 former employes of the West Virginia Pulp and Paper Co. who gave their lives during World War II, which has been placed on the main office of the company's plant here, was dedicated in a short service July 5.

Retirement Plan Benefits Nepco Men

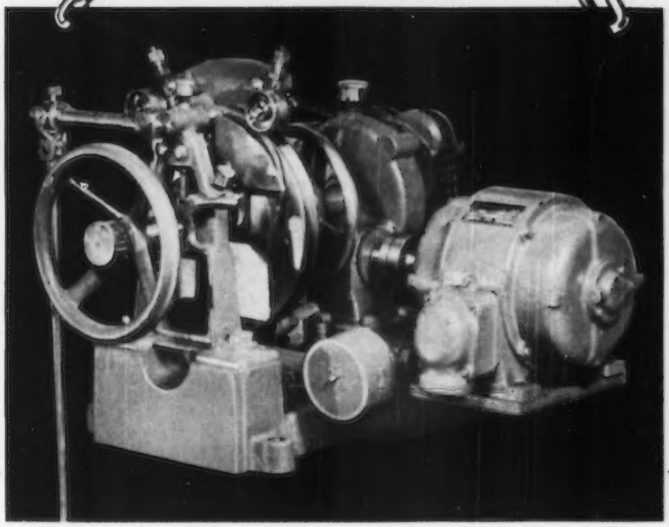
PORT EDWARDS, Wis. — The retirement of three Nekoosa-Edwards men under the Employees' Retirement Plan was announced during June. The men are Harry B. Rowe, George Winker and Alex Lampe. All of the men have been with the company for periods ranging from 31 to 41 years. Rowe retired on June 1 and Winker as of July 1. Lampe's retirement will be effective August 1.

Set Safety Record at Port Edwards

PORT EDWARDS, Wis. — A new all-time safety record was established by the employes of the Port Edwards mills of Nekoosa-Edwards Paper Co. on June 21 when a total of 109 consecutive accident-free days was completed. The record tops the best previous Port Edwards mark of 108 days with no accidents compiled in 1948. Today the new record has been extended to 126 days.

The new record is the best ever compiled at Port Edwards and the second best ever established in company history. It is exceeded only by the Nekoosa mill's record of 135 consecutive accident-free days during 1948. If the record can be extended until July 20, it will top all previous marks.

STARTS PAYING OFF FROM THE MOMENT IT'S INSTALLED



Bird Regulators Are Going In All Over The Place

— on pulp ahead of knotters and flat screens, at thickeners before bleaching, at pulp drying machines ahead of brown stock washers, on paper stock at the Jordans, at stuff chests and machine chests, after plunger or centrifugal pumps.

That's what users tell us about the Bird Consistency Regulator. It is false economy indeed to try to get along without dependable, automatic consistency control, these days.

With the Bird Regulator, consistency is never more than 0.1% off line either way, whether the stock is less than 1% or as heavy as can be pumped. The Bird Regulator stays on the job day in and day out, without attention. It's easy to install, anywhere.

May we send you layouts and estimates?

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

Jack Pine Pulpwood Deterioration in Yard Storage*

T. A. Pascoe[1] and Theodore C. Scheffer[2]

Abstract

A quantity of pack pine pulpwood was cut from a single tract in North Central Wisconsin, sufficient to allow a number of mill scale pulpings over a period of 26 months after cutting. Portions of the wood were in typical yard storage for 21 months of the period. Five mill scale pulpings were made on the rough wood and two on the peeled wood using the sulfate process. Pulp made at each storage interval was made into a standard grade of paper on the same paper machine.

Auxiliary studies were carried out on the wood to determine the effect of the application of a fungicide, the rate of moisture and density loss and associated amounts and degrees of decay. Density loss over the period for rough wood was 2.2 pounds per cubic foot. Laboratory scale pulps were prepared at each storage interval and laboratory beater tests were made on all pulps. The treatment with fungicide proved ineffective.

Paper made from the mill scale pulps from rough wood showed the greater loss in mullen strength with increase in wood storage time, whereas laboratory beater tests on mill and small scale pulps showed the greater loss in tearing strength as wood storage time increased. The total decrease in strength of pulps would be serious in mill operations.

Although the peeled wood incurred only negligible amounts of decay during storage it showed some loss in the strength of pulps made therefrom. This loss was much less than that shown by the pulps made from rough wood.

Introduction

The deterioration of pulpwood during storage on landings or in yards has been a frequent topic for discussion among pulp mill operators. In spite of the qualitative recognition that has been given the subject, there have been only a very few quantitative studies made and reported in this country. Much of the early information on the subject is of doubtful value because of the lack of adequate control data. In other words there is a sizable body of information available from the pulping of different woods that have undergone various stages of decay with no information on the same or closely comparable samples of the wood when in a sound condition.

There is a large amount of available technical information dealing with the habits of different wood decaying fungi and the mechanisms of their attack on the wood constituents. On the other hand, only a few studies have been made on pulpwood to evaluate the pulp quality and economic losses from the mill operating standpoint.

Literature Survey

Kress and co-workers (1) assembled most of the information available on the subject up to 1925. Investigations made by this group included:—an extensive survey of mill wood yard storage conditions, groundwood pulp storage practices and experiences, physical studies on sound and decayed pulp woods, pulping studies (groundwood, soda and sulfite) on sound and decayed woods, physical and chemical studies of pulps obtained, pulp preservation tests and microbiological studies on the woods and pulps included in the project. The results obtained that are pertinent to the present discussion were:

1. The factors that affect the life of wood in storage: time in storage, season cut, bark removal, presence of insects, methods of piling and general sanitary conditions in the wood yard.
2. Spruce stored 3 years showed a loss in groundwood pulp yield of 16 percent.
3. Chipping losses for chemical pulping ranged from 4.4 to 17 percent.
4. Sulfite pulp yield losses calculated on O.D. basis for wood and pulp were small; on a volume basis, larger losses would probably have been found.
5. Decayed wood used for soda pulping required a larger chemical charge than was required for sound wood.

In 1933 (2) one of the writers and associates at the Northwest Paper Company, in collaboration with the Forestry Department of the University of Minnesota, studied the effect of controlled progressive decay of disc samples from sound jack pine pulpwood sticks using two organisms isolated from wood in the mill pulpwood piles. One organism was a common member of the "white rot" group and the other belonged to the "brown rot" class. The results from this study showed that for the "white rot" organisms after 156 days exposure, under incubator conditions, the wood lost 17 percent in weight, 19 percent in density, and 10 percent in pulp yield when calculated on the basis of the weight and density of the sound control wood. The pulp strength factor decreased 12 percent based on the pulp from the sound wood. The "brown rot" organism under similar conditions of exposure showed a loss in weight of 12 percent, a loss in density of 12 percent, a decrease in pulp yield of 50 percent and a decrease in pulp strength of 30 percent. A striking fact in the pulping of the wood exposed to attack by this fungus was that it required an increase in chemical charge of 5 percent to reduce the screenings from 18 percent to 8 percent. The optimum charge was not determined because of lack of material for further study.

Creamer (3) has discussed the question of decay in stored pulpwood. In addition to speculating on the chemical changes brought about in the wood, he has pointed out the effect of decay on the chemical properties of the pulps prepared therefrom. His summary of the conditions necessary for the growth of wood destroying fungi includes:—(1) Sufficient moisture (30-40 percent), (2) at least a small amount of air and (3) a suitable temperature (75-95°F.).

Björkman (4) has published the results of a recent very extensive study of decay in pulpwood piles in Sweden. The decay of both pine and spruce woods was studied in wood yard piles and under controlled laboratory conditions. At least 40 species of fungi were collected and three-fourths of them were identified. An extensive study of growth conditions of a number of the common organisms showed that the important external factors affecting the decay of pulpwood in storage were humidity and temperature. Relative humidity is an important factor in the drying out of the wood to a level that will inhibit or prevent infection and growth of fungi. An extensive study of local climate within and between pulpwood piles showed the importance of proper piling to promote drying of the wood before decay became serious. A moisture content range of 35-85 percent based on O. D. weight was found to be optimum for the growth of decay organisms. Below 20 percent moisture the danger of

* Presented before the 31st Annual Convention of The American Pulp and Paper Mill Superintendents Assn., Inc., Edgewater Beach Hotel, Chicago, Ill., June 8-10, 1950.

[1] Technical Director, Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin.

[2] Pathologist, Division of Forest Pathology, Bureau of Plant Industry, Soils and Agricultural Engineering Agricultural Research Administration in Cooperation with the Forest Products Laboratory and the University of Wisconsin, Madison, Wisconsin.

infection was least and growing organisms were inhibited. Experimental pulpings using the sulfate and sulfite processes for pine and spruce respectively, showed pulp yield losses from 1 to 3 percent in one year of storage and up to 10 percent in two years of storage. Pulp strength decreases ranged from 5 to 10 percent after two years of storage. More destructive organisms were found to cause much greater losses.

Sulfite pulp was found to be much more seriously affected by decay in the wood than sulfate pulps. Although the author does not stress this last finding, it would seem to be of great importance in connection with the universal practice of storage seasoning of spruce wood for sulfite pulp manufacture.

Björkman's recommendations for the minimizing or prevention of decay losses are:

1. Water storage can be used in regions where summer and autumn temperatures are low but not over one year of storage.
2. Store peeled wood only in well drained, well located yards, in piles having adequate foundations and having ample intervals between piles for good ventilation.
3. Good yard sanitation should be practiced.

Wise (5) has summarized a great deal of existing information on the chemical and physiological mechanisms of microbiological attack on cellulose and lignin.

The effects of decay resulting from the growth of a number of species of fungi on several different species of woods has been studied from the sulfite pulping viewpoint by (6), (7), (8), (9), (10), (11).

Plan of Present Project

The present investigation was planned to yield definite information on the effect of prolonged storage of rough and peeled northern jack pine wood intended for sulfate pulping. In order to be able to relate the results to actual mill practice it was planned to conduct the study on a mill scale with laboratory investigations playing a somewhat minor role. It was planned to procure sufficient wood from a uniform stand grown on a limited area to allow periodic mill-scale pulpings and paper mill runs on the pulps during the storage period of the wood. The storage period was designed to include two summer seasons. The woods were stored in conventional ricks in a regular yard with provisions for normal proximity to other piles to closely simulate regular atmospheric storage conditions.

Materials

The wood selected for the project was cut during the last part of August, 1947, from a uniform stand on a single tract of typical North Central Wisconsin sandy soil. The wood was stored on landings until December and then shipped to the Nekoosa-Edwards Paper Company's Nekoosa yard.

A portion of the rough and peeled wood was treated immediately after cutting with a fungicide (Dowicide G).

A final scale of the wood, on arrival at the yard, showed:

1. 560 cords of rough untreated.
2. 80 cords of rough treated.
3. 160 cords of peeled untreated.
4. 80 cords of peeled treated.

Factors beyond control prevented the obtaining of the planned amounts of peeled and of treated woods. It was necessary, therefore, to plan for only two mill pulpings on the latter woods, one after one year of storage and one at the conclusion of the project. Five mill pulping runs were planned for the rough untreated wood.

Methods

The fungicide treatment of a part of the rough and peeled wood was carried out by spraying with a 5 percent solution of Dowicide G as soon as possible after cutting or cutting and peeling.[1]

The rough wood was treated only on the cut ends. The peeled wood was given an over-all surface treatment in the form of a spray application. Only the rough and peeled untreated jack pine are considered hereafter in this discussion. The reason for this selection is that the pulping data from the treated rough and peeled lots did not show significant differences from the results on the respective untreated woods. The failure to obtain differences due to treatment was undoubtedly due to natural factors, not readily amendable to control, rather than to failure of the fungicide.

At the time of each mill scale pulping from each lot of wood representative wood samples were collected for density and the determination of volume of decay and the decay index. A bolt of pulpwood taken at random from each grab load provided an adequate sample. Discs were cut from each stick for use in making these determinations.

Amounts of decay were recorded from evidence furnished by three discs sawed from each bolt, one from near the center and the other two from opposite ends at a distance of at least 32 inches from the center. An additional disc from near the center was used for the determination of moisture content and growth rate.

The decay was measured in two general ways:—by indicated reductions in the specific gravity of the wood and by quantitatively prescribed visible characteristics of the wood. The volume and the class (or stage) of decay was ascertained from color, toughness and hardness of the wood. The volume and class were integrated into a single measure that is referred to here as the decay index. Criteria for the decay classes and the derivation of the decay index are as follows:

Decay Classes

1. Wood discolored but discoloration not definitely attributable to decay.
2. Wood with definite brown decay discoloration. Slivers raised with a pick do not break near the pick; or the break is a splintering one.
2.5 Slivers raised with a pick break brashly (i.e. without splintering) near the pick; the slivers may be either comparatively long or short.
3. As for 2.5, with the addition that the wood also is plainly softer than normal to the pick.
3.5 As for 2.5, with the addition that the wood also is plainly softer than normal to the fingernail, and the slivers raised with the pick always break off comparatively short.
4. Wood with a "corky" or "punky" texture; lifting out with the pick in the form of chunks rather than as splinters.

$$\text{Decay index} = \frac{(\text{per cent of volume decayed})\ (\text{decay class})}{4}$$

$$\text{Maximum decay index} = \frac{(100)\ (4)}{4} = 100$$

Hardness and toughness appraisals were made with a chisel-type pick and fingernail on a flat surface exposed by splitting off a small segment of the disc being assayed. For this type of test, a disc not less than two inches thick gave the most reliable results.

While each lot of wood was being chipped, representative samples of mill-screened chips were collected. These samples were used for experimental cooks.

The mill-scale cooks were made in two 3½ ton digesters using 2,250 pound charges of active alkali or 14.8 percent expressed as Na_2O based on weight of O. D. wood. A cooking schedule was used of 1.75 hours to 130 p.s.i. and 15 minutes at 130 p.s.i. This procedure yielded pulps with permanganate numbers in the range considered best suitable for use as unbleached pulp.

Experimental cooks were made using the regular Nepco cooking schedule. This calls for 0.5 hour from 100-125° C., 2.5 hours from 125-170° C., and 1.0 hours at 170°C. with an active alkali charge of 20 percent as Na_2O based on O. D. weight of chips.

Pulps from each mill-scale pulping were made into paper by Thilmany Pulp & Paper Company, Kaukauna, Wisconsin. The paper made was a basis weight 30 pound (24 × 36—500) M.F. unbleached kraft paper made on the same paper machine under as near as possible the same operating conditions.

Paper tests were made after conditioning the samples at 50 percent R.H. and 73°F.

Laboratory beater pulp tests were

[1] The cooperation of the Dow Chemical Company, Midland, Michigan, is acknowledged in supplying the spray equipment and materials, also the services of George E. Olson of the same firm for assistance in treating the wood.

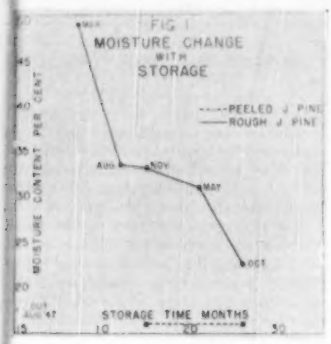
made on all mill-cooked pulps as well as on the small scale pulps using essentially TAPPI Standard Method T-200M.

Results

Effects of Storage on Woods

The moisture contents and densities of the woods during the storage period are shown in *Table I*.

The changes in moisture content and density with time of storage are shown graphically in *Figures 1 and 2*. *Figure 1* shows in a striking manner the contrast in the rates at which rough and peeled woods dry out to the point (23 percent moisture) where they do not support living fungi. The general significance of this wood moisture level—decay relationship is evident in *Figure 2*. The flat portions of both curves reflects the influence of winter conditions. In the consideration of density change the difference between rough and peeled wood is significant, representing at the maximum, around a pound per cubic foot. The total loss in the case of the rough wood was 2.2 pounds per cubic foot.



The relation between the action of wood decaying fungi, and decrease in density assumed above, is confirmed in this study by the information in *Table II* and *Figure 3*. Differences in elevation of the average lines in this figure appear to be partly the result of differences in initial (sound wood) specific gravities of the respective groups. Differences in the slope of the lines possibly arose from differences from period to period in personal judgment connected with the estimating. *Figure 4* shows, in a graphic manner, that within the range of this study the relation between damage or decay index corresponds closely to volume of decay.

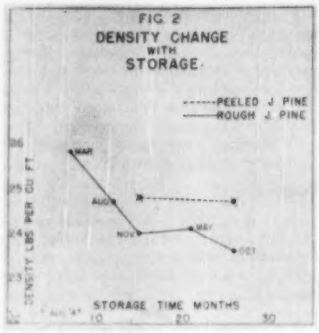
Most of the essential information on fungus damage to the rough untreated bolts appears in *Table II*. The most significant items with respect to decay are specific gravity and the decay index. Losses in specific gravity result chiefly from conversion of the lignin and cellulose to carbon dioxide and water.

During the fall and first winter of storage (7 months), no visible decay occurred in the rough-untreated bolts. A small amount of decay was present

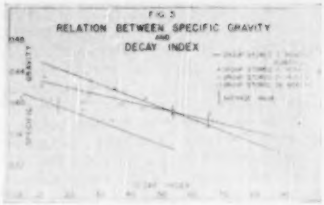
TABLE I

SHOWING STORAGE TIME, MOISTURE CONTENT AND DENSITY OF ROUGH AND PEELED JACK PINE WOOD

	Rough		Peeled	
Storage Months	Moisture %	Density Lbs./ Cu. Ft.	Moisture %	Density Lbs./ Cu. Ft.
7	49.0	25.8	...	...
11	33.3	24.7	...	...
14	33.0	24.8	16.0	24.8
21	30.8	24.1	...	...
26	22.5	23.6	16.4	24.7



in the heartwood of some bolts, but this had developed as heartrot in the trees. Absence of storage decay in this first period is attributable to the temporary protection against fungus infection afforded by the bark during the fall, and to the cold weather thereafter. By early August in the first summer, decay was established in nearly all the rough bolts. At this time the indicated loss in specific gravity was about 4.4 percent and the average decay index was 12.7. By November, after a little more than a year's storage, the indicated decrease in specific gravity was 6.0 percent and the average decay index was 42.6. Corresponding values approximately a year later, in October, were 8.7 percent and 51.7 percent. The sapwood at the end of the second year generally showed abnormal softness when probed with a pick but not when pressed with the fingernail (average class: 2.9).



It may be noted from the preceding figures that the progress of decay in the rough-untreated bolts was considerably greater in the first than in the second year. Decreasing amounts of moisture in the bolts undoubtedly brought this about, as wood with less than about 23 per cent moisture (total-weight basis) is immune, or nearly so, to decay. The average moisture content of 22 percent in the October 1949 group suggests that decay during a third year of storage would have been very small, particularly in view of the additional drying that would take place before the next warm-weather season.

TABLE II

CONDITIONS OF JACK PINE TEST BOLTS AFTER VARIOUS PERIODS OF STORAGE

	Rough Bolts					Peeled Bolts	
Storage time—months	7	11	14	21	26	14	26
Number of cords pulped (approx.)	76	80	60	65	115	40	150
Bolts examined				[1]			
Number	88	98	51	74	77	92	80
Percentage of amount pulped [1]	1.9	2.0	1.4	1.9	1.1	3.8	.9
Ave. diameter inside bark [2]	4.2	4.4	4.1	4.8	4.7	4.7	4.7
Ave. percentage of heartwood [2]	19	21	21	23	23	16	16
Ave. percentage of sapwood [2]	81	79	79	77	77	84	84
Ave. percentage of moisture [2]	49	33	33	31	22	16	16
Percentage of bolts with at least 23 per cent moisture	99	78	90	84	34	2	4
Decay							
Heartwood							
Bolts with heartwood decay, %	4.5	16.3	25.5	83.8	77.9	1.1	3.7
Ave. % heartwood volume decayed	.8	2.4	1.8	16.1	15.8	.1	.5
Ave. class of heartwood decay [3]	2.9	1.8	2.2	2.1	2.0	2.0	2.0
Ave. decay index for heartwood	.3	1.3	1.0	8.4	8.0	.4	.2
Sapwood							
Bolts with sapwood decay, %	0	99.0	100.0	100.0	100.0	30.4	27.5
Ave. percentage of sapwood volume decayed	0	36.1	80.0	82.7	89.0	2.0	1.8
Ave. class of sapwood decayed [3]	0	1.7	2.6	2.6	2.9	1.1	2.2
Ave. decay index for the sapwood	0	15.8	53.6	54.5	64.8	5.0	1.0
Entire Bolt							
Average percentage of entire bolt volume decayed	.15	29.0	63.6	67.4	72.2	1.7	1.6
Ave. decay index for entire bolt	.1	12.7	42.6	43.9	51.7	4.3	.9
Specific gravity (ave. per bolt)	.414	.396	.389	.387	.378	.393	.396
		.003	.004	.005	.004	.002	.003

[1] Assuming 60 bolts per cord.

[2] Based on a single disc from the center of each bolt. Moisture percentages are on the wet-weight basis.

[3] Based on 3 discs from each bolt, one from the center and the others 8 to 16 inches from the ends.

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Table III

MILL COOKED ROUGH & PEELED JACK PINE PULPS

	Storage Period Month	KMNO$_4$ No.	Mullen Value [1]	Tear Value [2]
Rough	7	24.7	322	391
	11	26.5	296	321
	14	25.0	310	324
	21	22.8	284	276
	26	29.8	271	292
Peeled	14	26.1	305	331
	26	20.5	292	310

[1] Sum of Mullen tests 25 and 45 minute beating intervals.

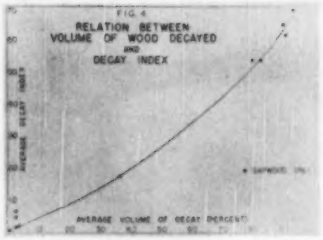
[2] Sum of tear tests 25 and 45 minute beating intervals.

Decay in the peeled-untreated bolts was limited to a very small amount (maximum index: 4.3) that occurred mainly in zones adjacent to seasoning checks, where rain water had accumulated from time to time. The negligible amounts of decay were the result of comparatively rapid drying of the bark-free wood, particularly during the first winter of storage. It is probable that the moisture content of the surface layers of the bolts was generally below the critical 23 percent needed for decay by the time warm weather was prevalent in the following spring. This is indirectly indicated by the average moisture content of the bolts, which was 16 percent in the fall, after 14 months' storage.

It should be kept in mind that the amounts of fungus deterioration observed would have been incurred over much shorter periods if the bolts had been cut and stored shortly after rather than preceding the cold-weather months. The difference in time might have amounted to as much as 5 to 7 months. At least 5 months (November through March) of the first 7 months of storage were too cold for appreciable fungus development. It also appears that in large winter-stored piles important fungus action may not begin in the spring until late in May, because of the persistence of low temperatures in the piles. Evidence to this effect is had in the negligible progress of decay indicated by both specific gravities and decay indexes for the period of November 1948 to May 1949 (Refer to *Figure 2*).

As the decay index is based entirely on personal estimates and interpretations its usefulness obviously must depend on the consistency and reliability with which the appraisals are made. The appraiser thus is a more or less inseparable factor of the appraisal, which is a condition that would tend to preclude use of the decay index for other than experimental purposes. It should be recognized, moreover, that the criteria used here for classifying decay in jack pine generally may be only partially suitable for other kinds of pulpwood. With different woods, different fungi generally are involved, with resultant differences in rate and visible manifestations of decay.

The decay index as used here served



as a check on amounts of decay indicated by changes in specific gravity. It also permitted simpler comparison than would be possible with any alternative method requiring consideration of both the volume and the class of decay.

As indicated in *Figure 4*, the decay index, for jack pine, would seem to have unique value mainly for comparisons involving wood in which more than about 90 percent of the sapwood is affected.

Effect of Wood Storage on Pulps

In *Table III* the mill cooked pulps are characterized as to degree of cooking and laboratory beater strength tests. It will be noted that there is some variation in permanganate numbers in the pulps produced at the different intervals of storage. It will be pointed out later that the general trend toward softer cooks, when using a constant cooking procedure, may be real. It also will be shown that such a trend had little effect on the loss in strength

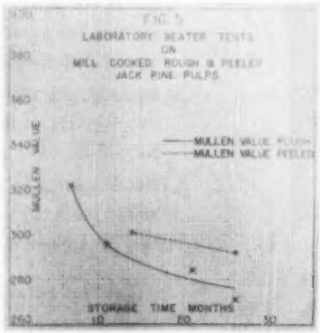


Table V

LABORATORY-COOKED PULPS FROM ROUGH & PEELED JACK PINE WOOD, NEPCO PULPING SCHEDULE

	Storage Period Months	KMNO$_4$ No.	Total Pulp Yield [2] %	Mullen Value	Tear Value
Rough	7	26.8	45.8	370	448
	11	22.2	45.8	342	413
	14	23.3	45.2	319	375
	21	21.5	43.1	319	331
	26	20.7	42.3	324	313
		28.2 [1]	41.7	321	338
Peeled	14	23.9	42.7	329	408
	26	23.6	43.9	342	426

[1] Cooked to higher permanganate number by decreasing time 40 minutes, results from a single cook.

[2] Based on O.D. weight of wood.

Table IV

TESTS ON MACHINE MADE PAPER

Storage Period Months	Rough Burst %	Rough Ave. Tear %	Peeled Burst %	Peeled Ave. Tear %
7	93.5	179	...	...
11	81.0	163	...	...
14	...	...	...	...
21	74.7	163	...	...
26	69.4	155	77.2	160

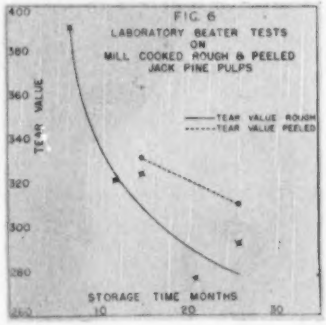
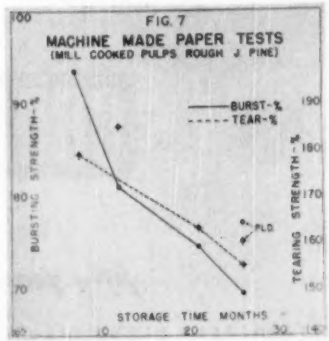


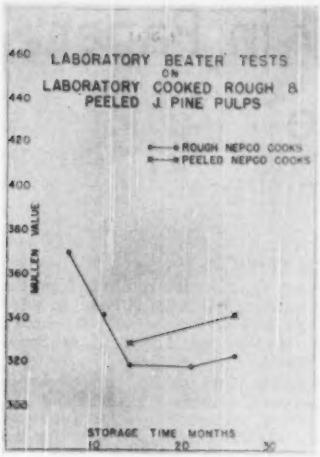
FIG. 6
LABORATORY BEATER TESTS ON MILL COOKED ROUGH & PEELED JACK PINE PULPS
TEAR VALUE ROUGH
TEAR VALUE PEELED
TEAR VALUE
STORAGE TIME MONTHS

with each additional period that the wood was in storage.

The changes in strength characteristics of these pulps, as determined by the laboratory beater test with advancing storage time, are shown in *Figure 5 and 6*. These results show for the rough wood pulps an unquestioned downward trend for both mullen and tearing strength associated with increased time of wood storage. It should be noted also that in this comparison the tearing strength suffered the greater loss. The results for the peeled wood pulps show only a small loss in strength between the two periods of wood storage. There is evidence that the peeled wood did lose some potential pulp strength during the first part of the total storage period. The reason for this loss is not evident from the available information.

Table IV and *Figure 7* show the results on pulp strength decreases, due to wood deterioration in practical terms of machine-made paper. It should be noted that these data show differences as to the relative loss in mullen and tearing strength. Whereas





the laboratory beater tests showed the greater loss in tearing strength, the paper tests showed the greater loss in mullen strength. The laboratory beater results showed a loss of 30 and 16 percent respectively for tear and mullen, while the paper tests show 13 and 25 percent loss for the same characteristics.

Thus far this study has involved the use of mill cooked pulps, laboratory tests thereon, and tests on mill made paper made from these pulps. These criteria have been used to measure the rate and degree of deterioration of stored wood as reflected in the pulps made therefrom. In order to evaluate additional measures for use in this connection, laboratory scale cooks were made on the woods at the same intervals during storage as in the case of the mill cooks. The resulting pulps were tested using the laboratory beater test. The data from these tests are shown in *Table V* and graphically in their relation to period of wood storage in *Figures 8 and 9*.

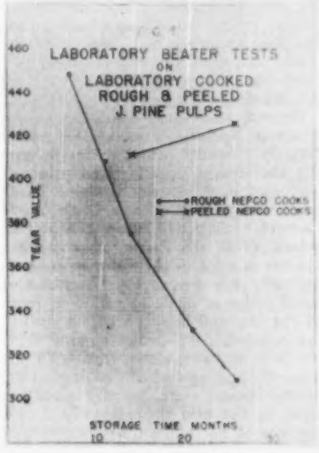
The Nepco laboratory pulps showed a significant decrease in permanganate number as the storage time increased. They also showed a trend toward reduced pulp yields with increase in storage time. In order to check the possible effect of the change in permanganate numbers on the yield and the strength of the pulps, the Nepco cooking schedule was altered to yield a pulp with a bleachability near that of the first cooks of the series. The results show that this change in bleachability during the series did not account for the decrease in yields or pulp strengths.

The laboratory pulpings yielded pulps showing progressively lower strength. These pulps also showed the greater loss in tearing as compared to the loss in mullen strengths.

A comparison of the pulps from peeled woods cooked using the laboratory schedule with the pulps from rough wood, shows a much greater loss in mullen than tear strengths. The apparent reversal of the mullen curve in *Figure 8* and the tear curve in *Figure 9* probably has no practical significance but can be attributed to experimental error or to a shift in the calibration of the laboratory beater. The lines representing change in mullen strength with storage time are the same general shape for the laboratory cooked pulps as in the case of the laboratory beater tests on the mill cooked pulps. Both show a significant loss early in the storage period with a leveling off of the loss rate during the later stages. This is in distinct contrast to the tear-storage relationship which shows a larger continued loss throughout the period of wood storage.

Conclusions

1. Through the use of the volume and class or degree of decay and integration of these values into a decay index, the progress of visible damage to the wood can be quantitatively expressed. This is true, at least, for the wood species used and the predominant decay organisms present in this study.
2. Because a correlation was found between decrease in density and the decay index the latter has somewhat more than empirical significance as a measure of decay.
3. Rough jack pine stored for 26 months (including two summers) can show up to 10 percent in pulp yield loss, if calculated on a wood volume basis. This would be a result of decrease in density.
4. Deterioration of rough jack pine pulpwood under normal yard storage conditions can be detected and measured on a mill as well as on a laboratory scale by pulping the wood and evaluating the pulps.
5. Rough wood shows a much greater damage from decay than peeled wood under the same storage conditions.
6. Rough wood shows the greatest rate of damage early in the storage period.
7. Pulps from peeled wood showed some decrease in physical strength after storage of the wood. This decrease seemed to occur early in storage.
8. For highest possible pulp quality, jack pine pulpwood should be used as soon as cut. Any storage in the rough condition will result in some loss in pulp quality.
9. If storage of over 4 to 6 months in warm weather is necessary, the wood should be peeled.



Acknowledgments

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Literature Cited

1. Kress, O., Humphrey, C. J., Richards, C. A., Bray, M. W., and Staidl, U.S.D.A Bulletin No. 1298 (1925).
2. Pascoe, T. A., Textor, C. K., Schmitz, H., Hella, R. P., Unpublished (1933).
3. Creamer, G. B., Pulp & Paper Magazine of Canada 51:87-90 (1950).
4. Mjökman, Erik, Cellulosa Aktiebolagets Meddelande Nr. 1 (1946).
5. Wise, L., Wood Chemistry, Reinhold Publishing Corporation, New York, (1944).
6. Chidester, G. H., Bray, N. W., and Curran, C. E., Paper Trade Journal 106, No. 14:43-46 (April 7, 1938).
7. Hagglund, E., Svensk Papers Tidn. 45, No. 7:123-35 (April 15, 1942).
8. Holzer, W. F., Paper Trade Journal 112: No. 19:38-40 (May 8, 1941).
9. Rue, J. D., Miller, R. N., and Humphrey, C. J., Paper Trade Journal 78, No. 4:45-50 (January 24, 1924).
10. Rue, J. D., Miller, R. N., and Humphrey, D. J., Paper Trade Journal 80, No. 9:49-50 (February 26, 1925).
11. MacGillivary, W. E., Pulp & Paper Magazine of Canada, 50, No. 2: 94-96 (February, 1949).

Analysis of Pulp and Paper Industry and the Raw Material Supply by K. G. Scheye will be concluded in the near future.

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High Speed Photography in Paper Mill Maintenance*

John H. Niemeyer[1]

No doubt you are all familiar with the so-called slow motion pictures of sporting events in newsreels. These are produced by operating the camera at a faster than normal rate and then projecting the resulting pictures at normal speed. For example, if a horse race is photographed at 120 pictures a second and the film is projected in the theatre at the standard rate for sound, which is 24 pictures a second, the speed of the horses will be slowed up five times. While slowing up human or animal action five times is generally sufficient for analysis of the motion, when it comes to the study of high-speed mechanical action and certain scientific phenomena, much higher camera speeds are required.

The Committee on High Speed Photography of the Society of Motion Picture and Television Engineers has defined high speed motion pictures as any which are made at a rate faster than 250 pictures a second, because of the mechanical limitations imposed on a conventional intermittent mechanism of a motion picture camera. Therefore, if cameras are made to operate at speeds greater than this, some means must be found for moving the film continuously. There are several methods for doing this.

Obviously, if the image and film can be made to move synchronously, the image in effect would be standing still during the exposure period. This could be achieved by moving the lens in the same direction and at the same rate as the film. Such a camera was built as early as 1910 by Charles Francis Jenkins. He mounted a series of matched focal-length lenses near the rim of a wheel with their optical axes parallel to the wheel axis. As the lens wheel was rotated, each lens in turn swept by the picture gate by means of a gear drive which kept the motion of the lens and film synchronized, and he was able to make a series of pictures at a very high rate of speed.

This system was not considered very satisfactory for several reasons. While the film is traveling along a straight line, the optical axes of the lenses travel in an arc. This results in a point of light being recorded as a small crescent-shaped spot. Though Jenkins improved his system in a later camera, the problem of finding the required number of matched lenses was still in evidence. Moreover, the mass of the lens-wheel combination was sufficient to require relatively long acceleration periods until the camera attained the desired speed. At this point there was always the danger that the lenses might go flying off into space due to centrifugal force.

The high speed camera designed by Edgerton moves the film continuously. Instead of using any of the methods described in this paper, however, this camera employs a stroboscopic light source as a shutter. The film movement is synchronized with an electronic light source in such a manner that as each frame of unexposed film is brought into position behind the lens the light flashes for a short period of time, amounting only to about 20 microseconds. Only the fastest moving objects will cause the image to blur in this short period. The disadvantages of this type of camera, however, are the fact that it has to be used in a dark or semidarkened room, and the fact that self-luminous subjects such as a spark or flashlamp can not be photographed.

Zeiss marketed a high speed camera in Germany before the war which used an entirely different principle. This camera employed a prism having several sides or faces, all of which were silvered. This prism was geared to rotate in synchronism with the film. The image of the subject coming through the lens was reflected off the surface of one of the prism faces to the film. As the prism turned, however, the image distorted and the resulting pictures were not very satisfactory from the standpoint of quality.

Several years ago, engineers of the Eastman Kodak Company invented an entirely different principle for achieving the desired result. This principle was used in the earlier models as well as in the present Kodak High Speed Camera. Instead of using a reflecting prism, as in the Zeiss camera, a refractor is used in the form of a small optically flat plate. Here again this small prism is made to rotate in front of the film and in synchronism with it. As it rotates, the image coming from the lens is swept downward with the film. By putting end pieces or shutters on the optical plate, thereby admitting light to the film through only a few degrees of its rotation, the progressive image deterioration resulting from the rotation is minimized. Here in principle is how the optical plate-shutter operates in the Kodak High Speed Camera.

As the plate, rotating in a clockwise direction, reaches a point about 18° short of vertical, the shutter begins to uncover the optical path permitting the image to reach the film. This continues throughout a total displacement of 36° or 18° beyond the vertical position, at which point the image is again cut off. As you can see, a picture is made each time the plate rotates through an angle of 180°, though only one-fifth of this time is used in making the actual exposure. Since two pictures are made for each rotation of the plate, it is interesting to note that at 3,000 frames a second the plate turns over 1500 revolutions a second or 90,000 rpm. Even though the plate and shutter assembly is not large, it must be very carefully balanced dynamically to tolerate such speed without bursting apart.

The Kodak High Speed Camera is capable of making pictures through the range of 1,000 to more than 3,000 frames per second. At top speed, this means that 100 feet of film will pass through the camera in less than three seconds, starting from rest. To attain acceleration of this magnitude, a 32-volt universal motor, to which 115 volts is applied, is used. Naturally, this puts tremendous tension on the film during the first second of operation. To prevent the film from parting during this period of acceleration, the camera is started at a lower voltage which is increased by an inter-connected rheostat. This rheostat can be present to control the approximate terminal speed of the camera.

With the film traveling at about 80 feet a second at the end of its run, it would be difficult for the operator to know just when to shut off the camera. If the switch is cut too soon, the film would likely pile up and jam the camera. If the switch is cut too late, the whipping action of the film would destroy a good part of itself. Therefore, an automatic cutout switch is built into the camera which shuts it off at the proper time.

It is often desirable to postpone the action to be photographed until the camera has attained its chosen terminal speed. This is accomplished through a built-in synchronizer switch which

* Paper presented before the 31st Annual Convention of the American Pulp and Paper Mill Superintendents' Association, Inc., held at the Edgewater Beach Hotel, Chicago, Ill., on June 8-9-10, 1950.

[1] Eastman Kodak Co., Rochester, N. Y. (Chicago Representative).

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will either open or close an external circuit after a predetermined amount of film has run through the camera.

The camera is focused and the image composed through the use of a telescopic magnifier having a slidable objective at the rear. In its forward position, this objective permits viewing a magnified image of the center of the frame for easy focusing. In its rear position, the objective permits viewing the entire scene to facilitate composing of the image. A strip of matte-surface film is placed in the gate for this operation.

The camera is equipped with a Kodak Ektar 63mm f/2.0 Lumenized Lens. For working at greater distances, a 102mm f/2.7 lens is available. For wide-angle work, it is planned to supply later on a 25mm f/1.9 lens.

The exposure time is equal to the reciprocal of five times the speed in frames per second. This means that when the camera is being operated at 3,000 frames per second, each frame receives 1/15,000 of a second exposure. For this reason a great deal of light is required for high speed motion pictures. Most operators use General Electric RFL2 or RSP2 lamps. Recently, however, a lamp known as the 750R40 was put on the market. It was designed especially for use in the making of high speed motion pictures and is capable of producing about 75,000 foot candles in an area four inches in diameter with a lamp-to-subject distance of 18 inches. Direct sunlight can, of course, be used for illumination at lower camera speeds.

High speed photography for the analysis of motion too fast for the human eye to perceive was not in general use before the war. However, the war proved the value of such studies and the field has been growing ever since.

With higher labor costs, it has become essential to obtain more work from each machine. This means that machines have to run faster, and troubles develop which were not in evidence at the slower speeds. High speed photography usually finds the trouble in a fraction of the time that it would take on the drawing board.

Practical Art of Color Matching on Paper[2]

By F. O. Sundstrom & E. I. Stearns[1]

Introduction

It is generally realized that the addition of color to paper is useful and beneficial and gives the paper manufacturer certain specific advantages. While the proper handling of color is an art which is acquired only by years of experience and practice, much of the art is based on sound scientific principles and facts.

The purpose of this article is to explain in a simple manner the relation of the art to the science so that the paper colorist will mentally have a clearer understanding of the principles involved and, therefore, be better able to utilize the dyes with which he daily comes in contact.

Description of Color Differences

It is highly desirable that a universal language be used by different people in the industry in talking about color differences so that there may be mutual understanding. One of the important aspects of color is strength. In considering strength a value of zero is always used to represent the undyed stock. In Fig. 1, zero strength is represented by the rectangle labeled "uncolored stock." When four pounds of Pheno Fast Scarlet 4BSY is added to 1000 pounds of stock,* the paper made from it will be slightly colored or tinted and is called pink in color. If, however, four pounds of this dye is added, the stock becomes a deep red in color. The difference between the white paper, the pink paper, and deep red paper is the concentration of Pheno Fast Scarlet 4BSY which is respectively 0, 4, and 40 pounds. This change is represented on Fig. 1 by the line connecting the rectangles labeled "uncolored stock," "pink," and "red."

When four pounds of Pheno Black SGN Conc. Dustless is added to stock, the resulting paper is gray in color. As more and more black dye is added, the intensity of the color increases and finally when 60 pounds of the black dye is added, the paper which produced is black in color. This change in color with the concentration of dye is indicated in Fig. 1 by the succession of three rectangles labeled "uncolored stock," "gray," and "black."

If Brilliant Fast Yellow G2N Conc. Dustless is used as the dye, six pounds makes the stock a canary and as the concentration of dye increases, the color becomes deeper and finally a rich, solid, goldenrod shade results with 40 pounds of dye. The strength chart in

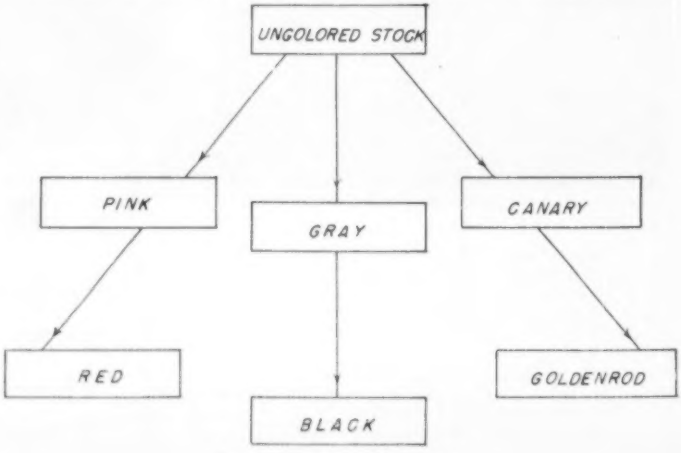

Figure 1—Strength variation of dyes

[1] Calco Chemical Div., American Cyanamid Co.

[2] Presented before the 31st Annual Convention of The American Pulp and Paper Mill Superintendents Assn., Inc. at the Edgewater Beach Hotel, Chicago, Ill., on June 8-9-10, 1950.

* Staining formulas are expressed in terms of percent dye in the staining solution.

* Beater dyed formulas in this article are expressed in terms of pounds per 1000 pounds of stock.

* The naming of dyes, and the plotting of representative points on a color map are not based on quantitative measurements. This particular dye, which is navy blue in name, is plotted in the blue area of the color map. This may mean that the dye is inaccurately named, or that the point is inaccurately plotted, or both. It is not recommended that the mental concept of a color map be reduced to exactness.

Fig. 1 illustrates that the addition of different amounts of dyes to the undyed, bleached sulfite stock introduces variations in color but always toward stronger, deeper colors.

There are, of course, reasons why the mental concept of increasing strength as shown in Fig. 1 may not be applied rigorously to all cases when working with practical dyes. For instance, although Benzo Purpurine 4BX Conc. Dustless is often used to obtain a deep red shade, this same dye is not often used in low concentrations to produce a pink because at the low concentrations other dyes are superior to it in brilliancy and stability to pH changes. To produce a light pink color, Eosine J may be used but again its application is limited. Eosine J would not ordinarily be used at increased concentrations to produce a dark red color because it lacks "body" and the cost of the dye required would be exorbitant. Thus, one should not think of any single dye as always being applicable over the entire range of strengths as illustrated in Fig. 1. Nevertheless, it is believed that this mental concept will be useful in any particular problem. When considering a stock dyed with Eosine J, it is convenient to think of a particular colored stock as falling on a strength curve somewhere between the undyed stock and the deepest color which it is practical to obtain. With this color path in mind, decide whether a particular sample is stronger or weaker than the standard. Likewise, in considering a dark red produced with Benzo Purpurine 4BX Conc. Dustless, it is convenient to think of a particular dyeing as falling somewhere between the lightest pink for which this dye might be used and the darkest red for which it might be used.

A strength difference, then, is any difference in color of two samples which can be accounted for by a variation in concentration of the dyes in the formula. In a formula involving a single dye, a strength difference is a percentage variation of that dye. In a formulation involving several dyes, a strength difference is a change in the over-all concentration of all the dyes, maintaining the ratio of each dye to the total.

A second main variation in color is shade. By shade is meant either a difference in hue or a difference in dullness. The following table shows how the common colors can vary in hue:

TABLE I

Nomenclature Used to Describe Hue Variation

Color	*Hue Variation*
Red	Yellower or bluer
Orange	Yellower or redder
Yellow	Greener or redder
Green	Bluer or yellower
Blue	Redder or greener
Violet	Redder or bluer
Brown	Redder or yellower
Olive	Yellower or bluer
Navy	Bluer or redder
Black	Redder, yellower, greener or bluer
White	Redder, yellower, greener or bluer

In addition to the hue changes described in *Table I*, all of the colors in the first column except white and black may also be duller or brighter, duller meaning that they tend toward a gray, and brighter meaning that they tend to appear less gray.

Table I and the terms "brightness" and "dullness" are the terms generally used to describe color differences. The terminology is not chosen haphazardly. The mental concept behind this system of describing color differences is a color map as is shown in *Figure 2*. The color map of Fig. 2 rationalizes the terminology presented in *Table I*. For example, if a number of green samples of paper are examined, it will be found that some of them are scarcely distinguishable from papers which are colored blue, while others are scarcely distinguishable from yellow papers. The shade variations of a green, therefore, based on experience with actual colors, are toward a blue or toward a yellow. This variation is indicated by the color map in that the blue and the yellow areas are both adjacent to the green area.

Another way in which a green paper may differ from a standard green color is to deviate toward a black or away from a black; that is, it may be described as being brighter or duller. As a green color becomes duller and grayer, it takes on a special name, "olive," and as it becomes still darker and duller, the sample eventually becomes black. The color map of Fig. 2 shows this shade variation of a green color because the olive area is also adjacent to the green area.

In the case of a yellow, it is not euphonious to speak of a yellow as being slightly oranger and therefore one more step is taken around the color map of *Figure 2* and a yellow is described as being redder if it deviates toward an orange. Again the concept of a color map will explain why a yellow color may be described as differing from another yellow color by being redder, greener, duller, or brighter.

Thus, a shade difference may be defined as a difference in color which cannot be corrected by varying the concentration of dye in a formula as a whole. In order to correct a shade difference, it is necessary to vary the concentration of one or more dyes in the formulation but the same percentage concentration change is not introduced into each dye of the formulation.

Figure 1 and *Figure 2* illustrate the two main concepts of color, namely strength and shade. These two concepts are seen to supplement each other if *Figure 1* is considered to be placed vertically and Fig. 2 placed horizontally. Thus, while the center of the color map of *Figure 2* is represented as black, this area represents a black of all different strengths from very weak blacks, which are really gray, to very strong blacks. Indeed, whites, grays, and blacks are all considered to plot in the center of the color map. All the variations in color which are produced by changing the concentrations of single dyes are also considered plotted in single areas. Both reds and pinks are considered plotted in the area which is labeled "red" and both canary and goldenrod are considered plotted in the area which are labeled "yellow."

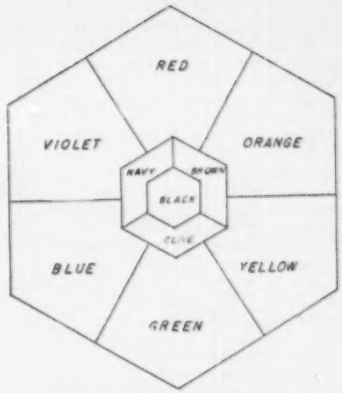

Figure 2—Shade variation of dyes

The color map concept is also of use in indexing dyes by color. For instance, in *Figure 3*, a color map is shown with 12 points plotted on it. These 12 points represent 12 acid dyes which are commonly used for calender staining. The names of the dyes are listed in *Table II*.

TABLE II

Acid Dyes Commonly Used for Calender Staining on the Paper Machine

1. Special Black M 9863 Conc. Dustless
2. Patent Blue 2Y Conc.
3. Acid Green 2G Conc. Dustless
4. Naphthol Green B. Conc. Dustless
5. Water Green SX Conc. Dustless
6. Acid Orange Y Dustless
7. Serisine B
8. Crocein Scarlet MOO Conc. Dustless
9. Acid Violet 4BNS Dustless
10. Chinoline Yellow W Conc.
11. Metanil Yellow M3X Conc. Dustless
12. Tartrazine Double Conc.

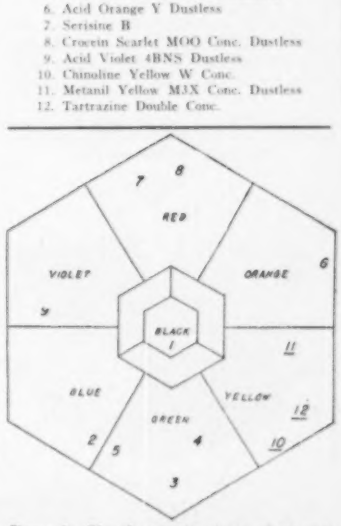

Figure 3—Classification by shade of 12 acid dyes commonly used for calendar staining.

In *Table II* there are three dyes listed which are yellow. These are Chinoline Yellow W Conc., Metanil Yellow M3X Conc. Dustless, and Tartrazine Double Conc. Now of course anyone who has worked in the mill with these colors is familiar with the differences in shade between them. But perhaps he wishes to describe to a new man what the color differences are or perhaps he has only two of these dyes in his inventory in the mill and is not aware of the shade of the third because he has not had experience with it. In any such case the concept of a color map will make it easier to have one man who is familiar with the shade differences describe these to a second man who is not. The color map of *Figure 3* shows, for instance, that the greenest yellow is No. 10, which is Chinoline Yellow W Conc. and the reddest yellow is No. 11, which is Metanil Yellow M3X Conc. Dustless. It shows this shade relationship because point 10 plots closer to the green area than does point 12, and point 11 plots closer to the red area than does point 12. It also shows that Dye No. 11 is somewhat duller than the other two because it plots closer to black. The shade differences between these three dyes, which are known to the man who has worked with them, can be represented by points on a color map.

Color of Mixtures of Dyes

When a bright greenish yellow dye is mixed with a bright greenish blue dye in the proper proportion, the result is a bright green. This is illustrated by the following formulation calender stained* on bleached sulfite stock:

Bright Green

8.5% Chinoline Yellow W Conc.
0.6% Patent Blue 2Y Conc.

When a reddish yellow is mixed with a reddish blue in the correct proportion, the result is a dull green which might be called an olive. Such a case is illustrated by the following calender stained bleached sulfite stock.

Dull Green

0.75% Metanil Yellow M3X Conc. Dustless
2.25% Acid Blue 2R

Finally, if the yellow dye becomes so red that it is truly an orange or if the blue dye becomes so red that it approaches violet, the combination of these two will produce a black. This is illustrated by the following formulation calender stained on bleached sulfite stock:

Black

3.5% Acid Navy Blue 10BN Conc. Dustless
1.5% Acid Orange Y Dustless

The known facts of color mixing, as illustrated by the above formulations, are that the selected combination of a yellow dye and blue dye will produce a bright green whereas other selected yellow and blue dyes will produce a very dull green which is practically a black. This behavior is easily understood with the concept of the color map. *Figure 4* shows a color map and on it point 1 represents Chinoline Yellow W Conc., while point 2 represents Patent Blue 2Y Conc. It will be noted that the straight line connecting these two points passes through the green area a considerable distance away from black, thereby signifying that mixtures of these two dyes will produce bright green. The map of Fig. 4 also shows point 3, which represents Metanil Yellow M3X Conc. Dustless, and point 4, which represents Acid Blue 2R. It will be noted that the straight line connecting these two dyes passes through the olive area, much closer to the black area than does the line connecting points 1 and 2. This signifies that the mixture produced by dyes 3 and 4 will be comparatively dull. In Fig. 4, point 5 represents the Acid Orange Y Dustless, and point 6 represents the Acid Navy Blue 10BN Conc. Dustless. It will be noted that the straight line connecting points 5 and 6 extends through the black area, thereby signifying that the mixture of these two dyes in the proper proportion would not produce a green but will produce a black.

It is well known to a man experienced in handling colors that the mixture of an orange dye and a black dye in the proper proportion will produce a brown color. Such a formulation is illustrated by the following produced by calender staining on bleached sulfite paper:

Brown

0.75% Special Black M 9863 Conc. Dustless
3.75% Acid Orange Y Dustless

This behavior is also predictable from a consideration of the color relationship on the color map. For instance, *Figure 2* shows that the brown area lies between the black area and the orange area. Therefore, if the orange dye and the black dye are plotted on the color map, it will be seen that the straight line connecting these two points will pass through the brown area. This indicates that one should normally expect an orange and black to produce a brown if mixed in the proper proportion.

It does not matter whether one is contemplating the addition of two dyes such as yellow and blue, which plot near the outer edge of the color map, or two dyes such as orange and black, one or both of which plot near the center of the color map. In any case, by considering a straight line drawn between two points representing two dyes, the nature of the shades produced by such mixtures can be estimated with the assistance of the color map concept.

Those men experienced in handling colors are fully aware that sometimes more of one dye is needed to correct a shade than another. For instance, suppose that a coating of Calcotone

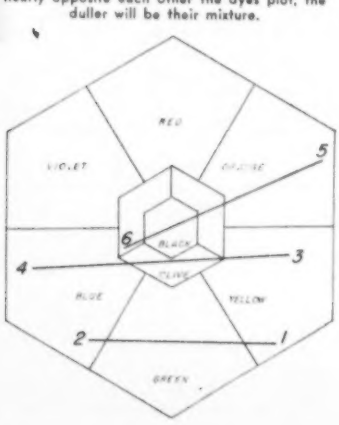

Figure 4—Effect of mixing dyes. The more nearly opposite each other the dyes plot, the duller will be their mixture.

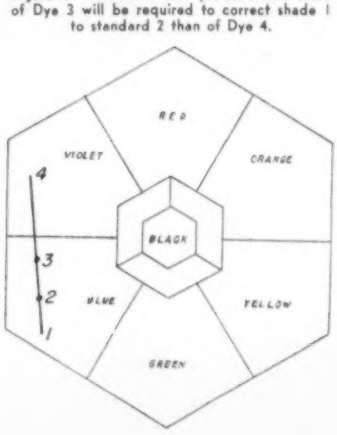

Figure 5—The Lever Law predicts that more of Dye 3 will be required to correct shade 1 to standard 2 than of Dye 4.

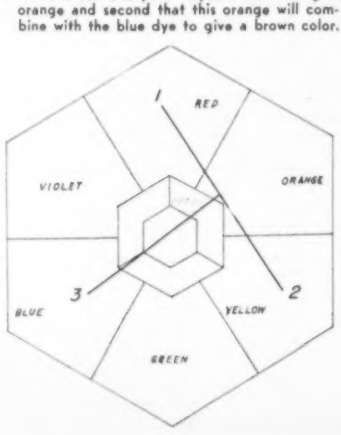

Figure 6—The fact that a mixture of red, yellow, and blue dyes will produce a brown color can be predicted by considering first that the red and yellow dyes combine to give orange and second that this orange will combine with the blue dye to give a brown color.

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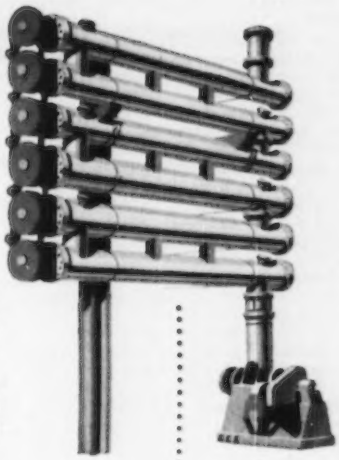

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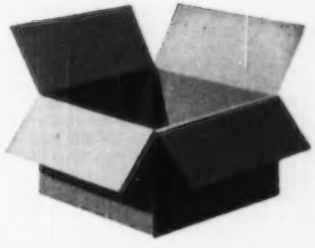

The unit illustrated was fabricated by Alloy Fabricators for Paper and Industrial Appliances, Inc., distributors of the Chemipulper. The reaction chamber tubes are made of 20% Lukens Stainless-Clad Steel, Type 304.

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BETTER PRODUCTS FOR BETTER EQUIPMENT

Blue G, which had been made in order to match a standard color, was found to be too green a shade of blue. It would then be necessary to add another dye to correct this shade. One method of correcting this shade would be to add Ultramarine Blue KB which would result in the following formulation:

Match for Standard Blue

10 pounds Calcotone Blue G Paste
60 pounds Ultramarine Blue KB
100 pounds Clay

This same preliminary shade could also have been corrected by the addition of a violet. This would be done by the following formulation:

Alternate Match for Standard Blue

16.4 pounds Calcotone Blue G Paste
4.0 pounds Calcotone Violet B Paste
100.0 pounds Clay

The Ultramarine Blue KB and the Calcotone Violet B Paste are approximately in the ratio of 1 to 6 tinctorially and therefore it is necessary to divide 60 by 6 before making a comparison of the pounds which were used to correct the shade. It is observed that ten pounds "corrected for strength" of Ultramarine Blue KB are needed, whereas only four pounds of Calcotone Violet B Paste are needed. The facts are that either may be used to correct the shade of Calcotone Blue G Paste to the standard shade but different amounts of the two are necessary, a smaller amount of the violet being used for the purpose.

The qualitative relationships illustrated by the above formulations may be suggested from the concept of the color map. Fig. 5 shows point 1 which represents the color produced with Calcotone Blue G Paste, point 2 which signifies the color of the standard, and point 3 which represents the color produced by Ultramarine Blue KB. From the fact that a straight line connecting points 1 and 3 passes through point 2, it is evident that the color of the standard can be produced by mixing these two dyes. The straight line connecting points 1 and 4, which represents the Calcotone Violet B Paste, also passes through point 2. This indicates that it is possible to match the standard by a mixture of Calcotone Blue G Paste and Calcotone Violet B Paste.

The next question is how to predict the relative quantities of the Blue or the Violet that are needed to bring about this correction. This is done by using the principle known as the Lever Law and is illustrated by two boys on a see-saw. On the see-saw, it is known that a fat boy close to the balance point has the same effect as a thin boy with a greater leverage. On the color map of Fig. 5, consider that the fulcrum is placed at point 2, and consider that it is necessary to balance the weight of Calcotone Blue G Paste represented by point 1 with a weight on the other side of the lever. It takes either a fat boy at point 3 or a thin boy at point 4 to balance this see-saw. It is evident from this analogy that a large amount of Ultramarine Blue KB represented by point 3 is required compared to the amount of Calcotone Violet B Paste located at point 4. It is not recommended that an attempt be made to reduce this system of predicting the result of color mixes to a quantitative basis. The color mixtures do not all fall exactly on straight lines between the points representing the dyes and the quantitative relationships can be thrown off by tinctorial strength and other factors. However, it is believed that the concept of the Lever Law on the color map will assist in the understanding of the quantitative behavior of dye mixtures.

It can easily be demonstrated in the laboratory that the following formulation will produce a brown color when beater dyed on bleached sulfite stock:

Three Dyes to Produce a Brown

12 lb. Pheno Fast Scarlet 4BSY
10 lb. Pheno Fast Yellow 95 Conc.
1 lb. 8 oz. Pheno Sky Blue 6BX Conc.

A prediction of the color which will result from mixing more than two dyes can be most easily deduced from the concept of the color map by considering the dyes in pairs. For instance, Fig. 6 shows points 1, 2, and 3, which represent respectively the red, yellow, and blue dyes which were used to produce the brown in the above formulation. First, a straight line can be drawn between points 1 and 2 and this indicates that a combination of these two dyes will produce any color falling along this line. Next, at some point along this line a second line can be drawn to point 3. This, then, is the expected range of colors which can result from mixing the blue dye with a combination of dyes 1 and 2. This second line passes through the brown area of the color map and therefore it is logical to expect that the proper proportion of the red, yellow, and blue dyes represented by points 1, 2, and 3 will produce a brown. In effect, it is considered that the red and yellow dyes are combined to give a single dye which is orange. Then is deduced what will happen when the orange is mixed with the blue.

The color resulting from a mixture of four dyes can be predicted in the same manner with the color map concept, namely by combining them in pairs. It is found experimentally that the following formulation will produce a black when calender stained on bleached sulfite stock.

Four Dyes to Produce a Black

0.4% Safranine GF Ex Conc.
0.7% Chrysoidine Y Dustless
0.2% Green MX Conc.
2.7% Methylene Blue 2B Conc. Dustless

It does not matter how the pairs are chosen. For example, a line may be drawn between the red and the orange and this will suggest the range of colors which can result from the combination of these two dyes. A second line can be drawn between the green and the blue points on the color map, again representing the range of colors which can result from these two dyes. Then a third line can be drawn between points somewhere along these first two lines. This third line can be drawn so as to pass through the black area.

Correction of Off-Color Lots

If the color of a production lot is not exactly equal to that of the standard, it is necessary to decide whether the color difference is one of strength or one of shade. This recommendation is based on the fact that strength and shade are often somewhat independent. It is usually possible to add a very small amount of a toning dye which will correct the shade without changing the strength radically. Also, it is frequently possible to increase the entire formulation by as much as 20 percent, thereby introducing a strength change without affecting the shade. In examining a lot, the experienced colorist may decide to increase the red dye in the formulation by 20 percent and to increase the over-all concentration of the entire formulation by 10 percent. Both of these additions may be made simultaneously.

It is true, however, that strength and shade may sometimes be confused. This fact is illustrated by Brilliant Fast Yellow 2GN Conc. Dustless which at low concentrations gives a greenish shade of yellow and at high concentrations gives a reddish shade of yellow. A mere increase in concentration will introduce a radical shade change. Hence, if a yellow dyed stock is slightly redder than the standard, it might be misinterpreted as a shade difference when it really is a strength difference. The best way to determine whether the difference is one of strength or shade is to prepare a stronger and weaker dyeing of the dye formulation in question. This strength series will then illustrate the shade differences that can be expected as the strength is varied.

In correcting shade differences, the mental concept of a color map is again useful. Consider the standard and the production lot to be plotted on the color map. It then follows that the dye which must be added to bring the production lot to the standard is one which plots on the color map in such a location that a straight line may be drawn through the three points representing the production lot, the toning dye, and the standard; the middle point being the standard.

Sometimes an experienced colorist will use a single dye to correct a shade and sometimes he will use a combination of two dyes to correct a shade. For example, if a paper made with Green MX Conc. beater dyed on bleached sulfite stock is not the same shade as the standard, it may be possible to correct it to the standard by the addition of Pheno Navy Blue, resulting in the following formulation:

Green Corrected by Single Dye

5.0 pounds Green MX Conc.
2.5 pounds Pheno Navy Blue

On the other hand, it may also be possible to correct the dyeing of Green MX Conc. to the standard shade by the addition of two colors, namely Methyl Violet 4BPX Conc. Dustless and Nigrosine O2P. The following formulation gives exactly the same shade and strength as the above formulation:

Green Corrected by Two Dyes

4.50 pounds Green MX Conc.
0.25 pound Methyl Violet 4BPX Dustless
1.00 pound Nigrosine O2P

It may seem strange to those unfamiliar with color correcting techniques that a suitable color correction can be arrived at by either of two methods, either by adding one dye or by adding a combination of two dyes. However, the theory of the color map makes it quite evident why this can happen. *Figure 7* shows a color map on which point 4 represents the standard shade which is to be achieved and point 5 represents the dyeing obtained with the Green MX Conc. by itself. Since the Pheno Navy Blue which is represented by point 2* plots in such a position that the straight line connecting points 2 and 5 passes through 4, it is clear that the proper proportion of the Pheno Navy Blue and the Green MX Conc. will produce shade 4. Also plotted on *Figure 7* are points 1 and 3 representing the Methyl Violet 4BPX Conc. Dustless and the Nigrosine O2P. Since a straight line connecting point 1 and point 3 intersects the straight line through points 5 and 4 extended, it is clear that the proper proportion of the dyes represented by point 1 and point 3 can be used to correct 5 to 4. Either a mixture of Methyl Violet 4BPX Conc. Dustless and Nigrosine O2P or the single dye Pheno Navy Blue will suffice as a toning dye to correct the shade of the Green MX Conc.

Formulation of a New Color Match

It is very difficult to say how an expert color matcher thinks when he arrives at a color match. This difficulty may be illustrated by an analogy. Suppose a man is driving an automobile down the street when suddenly a child dashes out from the curb. The driver immediately uses his left hand to turn the wheel to swerve the car away, blows the horn to warn the child with his right hand, pushes in the clutch with his left foot and transfers his right foot from the accelerator to the brake. Try to answer the question of how the man thinks in order to avoid hitting the child with the car! Actually, he does everything at once in a subconscious manner. Any description of his actions in which it is said that he first raises his right foot from the accelerator, etc., fails to portray the remarkable coordination and ability of a skilled driver. Nevertheless, it is possible to describe the various physical actions through which he goes.

In the formulation of a new match,

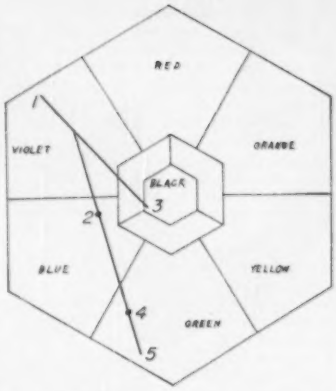

Figure 7—Alternate means of correcting shade. Shade 5 may be corrected to standard 4 either by the addition of Dye 2 or by the simultaneous addition of Dyes 1 and 3.

a man will automatically draw upon his experience and very quickly select the proper dyes. When an experienced color matcher is suddenly confronted with a piece of purple paper and asked for a color formulation, almost immediately his reaction is "methyl violet." In this very rapid selection of the funmental dye for the color match, however, he has considered several factors. First among these is the availability of the dyes to him. The selection of dyes for the match should be made from colors already available in his dye room so that he will not have to buy another dyestuff and thereby increase his inventory to match this shade. The second consideration is the application properties of the dyestuff. If the shade is to be produced by beater dyeing, then a dye suitable for this application must be chosen. Another factor is fastness properties. The dye finally selected must be among those which has suitable fastness to light, alkali or other requirements. A fourth factor is cost. The dye should be chosen which will be the most economical one to do the job satisfactorily. These four factors are all considered simultaneously as the experienced colorist rapidly arrives at a suggested dye mixture to approximate the desired color.

The concept of the color map then comes into play after a few selected dyes are under consideration. Often one dye will be the main color and will require toning by one or two others. The choice of these toning colors may be facilitated by the principle of color mixing which was explained above. It is often true that several different combinations might be used. This is particularly true in producing a dull color such as brown. It is known, for instance, that a single dye can produce a brown. An example, beater dyed on unbleached sulfite stock, follows.

Brown No. 1

15 pounds Bismark Brown RX Conc. Dustless

On the color map this would be represented by a single point plotting in the brown area.

It is also known that a brown can be produced by the proper mixture of orange and black as illustrated by the following beater dyed formulation on unbleached sulfite stock:

Brown No. 2

20.0 pounds Acid Orange RR Dustless
3.7 pounds Nigrosine J

On the color map this would be illustrated by drawing a line between the orange and the black area and observing that this line passes through the brown area.

It is also known that a brown can be produced with a mixture of orange and blue (or navy) dyes as is illustrated by the following formulation:

Brown No. 3

25.0 pounds Acid Orange RR Dustless
1.7 pounds Acid Navy Blue 10 BN Conc. Dustless

The fact that this combination of dyes when beater dyed on unbleached sulfite stock will produce a brown can be expected because on the color map the line drawn between orange and navy blue is observed to pass through the brown area.

It is also possible to make a brown by a mixture of a bluish red and greenish yellow. For instance, this will result by the beater dyeing on unbleached sulfite stock of the following formulation:

Brown No. 4

9.0 pounds Direct Garnet BY Conc.
27.5 pounds Direct Chinoline.

This brown would be expected on the basis of the color map concept by the fact that a straight line connecting the bluish red area and the greenish yellow area passes through brown area.

A brown can be produced with a combination of three dyes; for instance, the following formulation dyed by beater dyeing on unbleached sulfite stock will give a very pleasing brown shade.

Brown No. 5

12.0 pounds Pheno Fast Scarlet 4BSY
10.0 pounds Pheno Fast Yellow 9S Conc.
1.5 pounds Pheno Sky Blue 6BX Conc.

This color can also be predicted on the color map by considering first the combination of red and yellow to produce orange and second by observing that the line connecting the blue and the orange in the color map passes through the brown area.

A brown color on unbleached sulfite stock can be produced by a mixture of the following three colors:

Brown No. 6

0.6 pounds Methyl Violet 4BPX Conc. Dustless

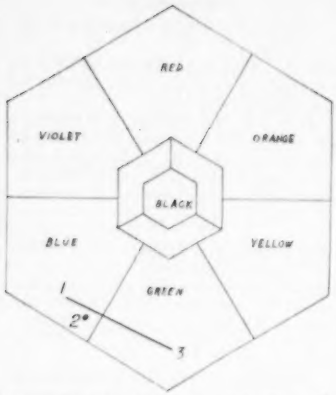

Figure 8—Impossible color match—Since all mixtures of Dyes 1 and 3 fall on the dull side of Dye 2, it is impossible to match the brightness of Dye 2 with any combination of Dyes 1 and 3.

22.5 pounds Chrysoidine RS Dustless
0.1 pounds Green MX Conc.

That this combination will produce a brown will also be expected on the basis of the color map. If a line is drawn between the point representing the violet dye and the point representing the orange dye, it will be observed to fall in the red area. From a point in the yellow end of this line another line is drawn to the green. It will be observed that this second line passes through the brown area.

This shows that there is often quite a wide choice in the production of a dull color. A paper colorist demonstrates his skill by choosing a formulation which is the cheapest and most desirable from the viewpoint of fastness properties and working properties. The multiplicity of possible matches is reduced to a logical basis by the concept of the fundamental color map.

Occasionally someone is asked to make an impossible color match. For instance, one may be asked to match the shade produced by ½ percent of Patent Blue 2Y Conc. stained on bleached sulfite stock, using any other combination of dyes. As one attempt it is possible to choose a redder blue such as Acid Blue FFR Ex. and try to shade it with Acid Green 2G Conc. Dustless, but when these two dyes are mixed so as to produce a blue of the correct hue, it is found that the mixture is too dull. This is easily predicted on the basis of the color map as shown in *Figure 8*. On *Figure 8*, point 2 represents the plot of the color produced by the Patent Blue 2Y, point 1 represents the color produced by Acid Blue FFR Ex., and point 3 represents the color produced by Acid Green 2G Conc. Dustless. However, it is evident that the straight line connecting points 1 and 3 does not pass through point 2. Thus, regardless of the relative concentration of the two dyes, 1 and 3, the resulting blue will be too dull to match the Patent Blue 2Y.

Another impossible situation is when the request is made to produce a bright pink color on an unbleached sulfite stock. Suppose that one pound of Rhodamine BX Conc. has been beater dyed on bleached sulfite stock and a request is made to match this on unbleached stock using the same dye. The color of the unbleached sulfite stock is equivalent to that produced by a yellow dye on bleached sulfite stock. Therefore, the color produced when one pound of Rhodamine BX Conc. is dyed on the unbleached stock will be equivalent to a mixture of a yellow dye and the red dye on unbleached sulfite. This "yellow dye" which is present in the unbleached sulfite. This "yellow dye" which is present in the unbleached stock cannot be varied in concentration and, therefore, the color will always be somewhat duller and yellower than can be obtained on a bleached stock paper. On the color map this would be represented by a line connecting three points, one representing the Rhodamine BX Conc. on the bleached stock, one the Rhodamine BX Conc. on the unbleached stock, and the third representing the yellowish white color of the unbleached stock. The red on the unbleached stock must fall somewhere between the two points representing the ends of the line because both "dyes" are present. The only way that the shade can be corrected is by removing the yellow color, which cannot be done under the definition of the problem.

Finally, in the visual evaluation of color there are many factors which influence the color which is observed. One of the important factors is the light source. An illustration is that of the following two bluish gray formulations. These two formulations when examined in daylight will appear alike but when examined in incandescent light will appear different.

Gray No. 1

7.50 lb. Pheno Sky Blue 6BX Conc.
1.23 lb. Pheno Fast Scarlet 4BSY

Gray No. 2

1.75 lb. Nigrosine O2P
0.48 lb. Methyl Violet 4BPX Conc. Dustless
0.14 lb. Green MX Conc.

It is believed that the above concept of a color map underlies much of the thinking of the experienced paper colorist. If the above principles and color map are integrated, many of the complexities of coloring will become more logical and the science that underlies the art will be more appreciated.

Engineering Management in the Lime-Recovery Plant

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In the lime-recovery plant of the paper mill, the kiln is the very heart of the operation. A pipe-line may become clogged and resist opening, or a mud washer may become inoperative for several hours, or the screw feeder may go down for repairs; but so long as the kiln is functioning in a manner that appears normal, the lime-recovery plant, as a whole, enjoys a state of economic health generally termed good. So long as the kiln stays on the production line, the weekly, bi-weekly, or monthly reports issued by the cost department are not too unfavorable.

But the rotary kiln is a temperamental tool. A mud ring may have to be dug out or blown out. This may require shutting the kiln down for an extended length of time. Or, for some unaccountable reason, the kiln becomes too cold, and it must be stopped for a period of heating. Then there are those infrequent but seemingly unavoidable periods when the refractory lining becomes so deteriorated that a major shut-down is necessary to make the required repairs. These items are classified as fateful operating hazards that cannot be avoided. Their occurrence generally can be anticipated since there are hours, or even days and weeks, of warning. Thus all the necessary preparations can be made to keep the shut-down time to a minimum, and to have on hand an adequate supply of purchased lime to fill in for that which will be lost in production.

During these times practically everyone in the mill organization is familiar with the situation. The Manager knows what to expect in the way of production loss and repair costs. The cost department is prepared to allow for the bulge in costs for this period.

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The chief engineer, or the master mechanic, has an opportunity to repair some part of the kiln or auxiliary that needs attention. There is a rush to get the kiln back into the production line again.

But it is not always these major afflictions that undermine the economic health of the lime-recovery plant. It is true that these are the most spectacular, and as such they draw the attention of Management. Often, however, it is the minor diseases that are causing the lime-recovery plant to suffer from an economic acnemia.

The kiln, its auxiliaries, and the performance of both, all have been discussed in great detail from the viewpoint of pure engineering. It seems that the interest of those who have charge of the kiln in the lime-recovery plant settles into a single groove directed primarily and directly at attaining maximum capacity with a minimum fuel consumption per ton of product. Gas analyzers will be installed to enable closer control of combustion. The search for new and improved devices to bring about greater production or lowered fuel consumption goes on without end. All manner of gages and instruments are being used to aid in the control of operating conditions so as to attain the best possible results with the lime-recovery unit.

These appliances and instruments do have a definite place in the scientific operation of the modern lime-recovery plant. Judicious expenditures for such devices, when they are sensibly applied, are sound investments. On the other hand, the technical control of the processing operation in the kiln doesn't mean that this, in itself, will make the unit the economic advantage that it can be.

Engineering Management

Engineering Management is fully as important as process control in the operation of the lime-recovery kiln. Besides having proper technical control of the processes going on in the kiln, the overall operation must be so managed that it is continuous and uninterrupted. Since the kiln is the heart of the lime-recovery plant, it must function continually if the system is to function properly. When the kiln is not producing, the costs continue, but the means for meeting these costs have been stopped.

Down-Time

Down-time consists of those periods when the kiln, for some reason or other, is out of production.

It is not possible to eliminate completely and forever the causes for down-time. The major causes especially cannot always be avoided. There may be times when the production rate exceeds the demand. There are times too when the refractory lining is so deteriorated that a major repair must be made to it. These major interruptions, it is true, seriously affect the economy of the operation. And these can, in a measure, be overcome or delayed; but the numerous though small and unscheduled periods of down-time insidiously eat into the economical operation of the plant.

Nuisance Down-Time

Seemingly unavoidable, innocent, and insignificant, these small but frequent periods of down-time become an accepted nuisance attending the process and thus may be ignored by the operating crews. Yet in many instances these minor interruptions prevent the lime-recovery plant from performing at its greatest possible efficiency. All these little, unscheduled shut-downs are taking a toll far greater than is generally realized. Seldom do they exceed an hour or so at a time. Many are not more than a few minutes in duration. But in many installations the total sum of the time lost to production because of these minor shut-downs makes an astonishing total.

The mill management generally is fully aware of the cost of the major shut-downs, regardless of their cause. But this same management is not always familiar with the cost of the kiln nuisance down-time. Often, when the aggregate cost of many minor stoppages is shown to management in its proper light, it is an eye-opener.

The reduction of kiln down-time, the overcoming of those seemingly little, insignificant periods of fifteen or twenty minutes when the kiln is stopped to tighten a foundation bolt or repair a drive-belt, or replace a ring-gear stud, depends largely upon the quality of the Engineering Management practiced in the mill. Where the practice is loose and uncoordinated, the periods of minor shutdowns may be frequent and of comparatively long duration. Where the practice is well organized, these down-time periods can be practically eliminated.

Cost of Minor Down-Time

Management generally takes this down-time seriously when it becomes aware of its cost. It is not difficult to approximate. Simple arithmetic will serve. For every hour of nuisance down-time, multiply by the average hourly lime production rate, and multiply this product by the unit value of the lime if it had to be purchased.

Purely as an example, let it be assumed that the kiln has a productive capacity of three tons of lime per hour and that the cost of purchased lime, delivered to the mill, is $12.50 per ton. Then a down-time period of one hour costs the company $37.50. This is the minimum cost. If the demand for lime warrants a yearly operation of 340 days, and with only one hour of down-time per day, such an operation as this example will suffer a loss of $12,750 per year.

Engineering Management Reduces Down-Time

The author is familiar with an operation where the practice in the kiln plant required each of the three shifts for the day to stop the kilns and auxiliaries for the purpose of lubricating the machinery. With flashlight in one hand and the grease bucket or the oil-can in the other, the kiln burner and his helper scurried about the plant on the run to accomplish this chore in twenty minutes. Cat-walks covered ankle-deep with dust, and ladders that had to be climbed with one hand, were added hazards of this scampering activity. Elevators, conveyors, kiln drives and trunnion bearings, electric motors and what-not, all received this respectful attention thrice daily. Thus an average of one hour's production time daily was lost forever because of two excellent plant rules and an abominable system of Engineering Management.

Among many others, one of the good safety regulations, which this company enforced, sternly forbade any man lubricating a piece of machinery while it was in operation. Another, and a good operating regulation, demanded a regular schedule of lubrication.

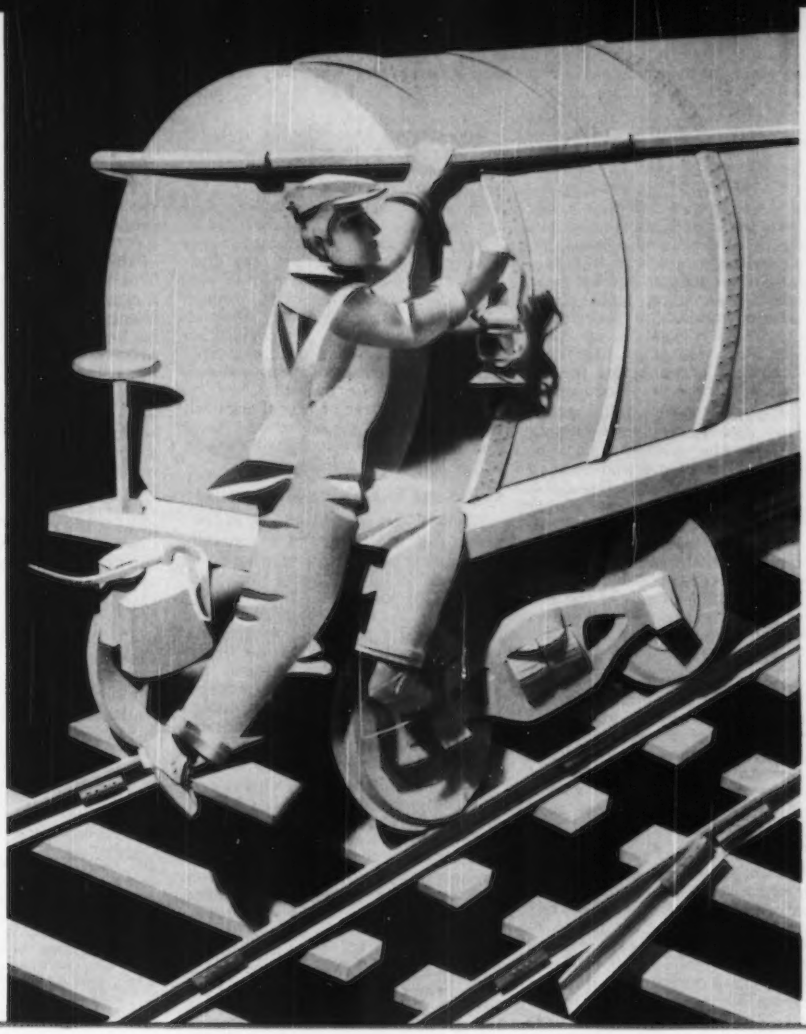
In this plant there are three units of two kilns each. The combined production capacity was about 330 tons per day, or 13.75 tons per hour. At the time this lubricating schedule was in effect, the selling price of the product was about $9 per ton F.o.b. cars. Thus, this system of lubrication alone was costing the manufacturer at least $124 per day of scheduled plant operation. The management had tolerated this down-time for several years, despite the fact that the solution to the problem was ridiculously simple.

The old-fashioned grease cups were replaced with grease-gun fittings on extension pipes. Oil cups were replaced with wick-oilers on extension tubing. The oil reservoirs and grease-gun fittings were located outside the safety guards along walkways, and were grouped wherever possible. This allowed the required lubricant to be applied easily and quickly while the man stood beyond any point of danger.

This simple piece of Engineering Management eliminated costly nuisance down-time. And in a similar manner, like problems of Engineering Management must be overcome.

In another instance the official of a company was deeply concerned about the high cost of frequent repairs and replacement of the kiln refractory lining. It developed that the kiln was shut down every three or four weeks for several hours to renew the hammers and liners in their coal pulverizer. Such shut-downs are notoriously hard on the life of refractory linings.

This is one of the poor features of the old style coal mills. They did a good job while the hammers, liners,



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and fan were in good condition. But after a few weeks of constant service, especially with a coal of inferior grindability, the fineness of the coal delivered to the kiln becomes coarser and coarser until finally it must be shut down for repairs.

It is a well-known fact that a kiln shut-down of several hours' duration, entailing a chilling and then a re-heating, generally results in the spalling off of the coating in the hot zone. And when this coating spalls off, it takes with it from one to three inches of the refractory block lining. With a 6" kiln block, not many such shut-downs can be tolerated before the lining needs a patch or replacement.

The solution of this problem of high refractory cost was relatively simple. There were two courses open, the choice depending upon the attitude of the company. The first, and probably the least costly in first charges at that time, was to install a duplicate pulverizer so that a spare was ready to go into operation almost at a moment's notice. The second possible solution was the installation of one of the better but more expensive pulverizers that do not require repairs so frequently.

These examples, besides illustrating the manner in which problems in Engineering Management are solved, also show the value of having the operation surveyed by an engineer who is competent to detect real problems in engineering management, and who is capable of presenting the best solution.

In most instances the Engineering Management of rotary kiln plants is poorly organized, or not organized at all. In order to do the job effectively it must be systemized. Nor is a haphazard, hit-or-miss arrangement much better than no system at all. In most mills the lime-recovery kiln operation suffers not so much from a lack of competence in the supervisors as from a lack of attention. The supervisors have many duties beyond the lime-recovery kiln, so that it cannot receive more than casual attention.

The first place to begin organizing the Engineering Management program is not out in the plant, but in the main office. Management itself must become conscious of the cost of down-time. Management must provide the machinery, the system, under which an effective system of Engineering Management can operate. And management must have a sympathetic and understanding attitude for this work.

It is all very well to review the daily, weekly, or monthly reports on production and fuel consumption, and maybe berate the poor plant operator because production was down and fuel consumption was up; but these items in themselves are not the important elements of the problem. It is of the greatest importance to know the *what? why?* and *how* of unproductive down-time. Production and fuel consumption generally are what they are as a result of good or poor operating practices.

Management must take the initiative in any program to reduce down-time. Although the plant operators usually are more than willing to cooperate on such a program, by themselves they are quite helpless. They will make suggestions and recommendations readily if encouraged, but they don't control the purse-strings; nor do they have the authority to carry through a complete program; nor do they always have the scientific or engineering ability to make sound decisions. And unless these recommendations and suggestions from the operators are accorded the courtesy of official acknowledgement and consideration, these tokens of personal interest will dwindle to the vanishing point.

Organizing Engineering Management

In the larger operations, the organization may include one man, generally an engineer or technician, whose sole duty it is to follow closely the operation of the kilns and their auxiliary equipment. As we have observed from the previous examples illustrating the savings that are often possible by reducing down-time, the full-time employment of an engineering manager can, more often than not, be justified economically. He should be delegated adequate authority to command respect for his decisions.

In the smaller plants where, possibly, only one small kiln is operated, the office of engineering manager may be filled by one covering a variety of assigned duties. This is not always satisfactory, since there is a diversion of attention; the sense of appreciation for the problem may become distorted; and judgement therefore impaired. Some men will fill these multiple offices quite well, while others cannot.

In many cases it is an excellent and effective plan to have a specialist survey the plant and its operation for the purpose of getting unbiased opinions and recommendations for improvements. The viewpoint of such an outside observer is not hampered by tradition or misdirected authority. He is not likely to be bewildered when it comes to distinguishing between the trees and the woods. The very strangeness of the plant will throw into bold relief any irregularities or incongruities that are accepted as commonplace by those familiar with them.

Nevertheless, and regardless of the manner in which the office of Engineer Management is filled, Management must be fully acquainted with the amount and causes of down-time.

What happened that caused the down-time? *Why* did it happen? *How* can a recurrence be prevented? Only by getting the true answer to these questions can down-time be reduced or eliminated. In order to have the lime-recovery plant operating at its best possible economy, every effort must be directed toward keeping the kiln rolling. It must be turning out material every minute it is on the production line if the best possible economy is to be realized.

The Daily Log

With the Main Office organized and receptive, the next essential in any program to reduce down-time is to get into a form of record every minute of down-time and its apparent cause. This is best accomplished by keeping a complete daily log of the kiln operation. The operator must include in his log the number of minutes or hours of each interruption and ascribe to it some direct cause.

An operating log of the lime-recovery plant is a *must* if the goal is to be the best possible plant economy. In no other way is it possible to have a record of the causes and effects that prove to be so important in the overall operation. The log must be a complete history in detail of the plant's functioning, and this includes all shut-downs and their apparent causes.

The plant office can transpose these down-time entries from the daily log to the down-time record sheet. Thus the down-time record sheet may be similar to *Table I.*

TABLE I

LIME-RECOVERY PLANT—KILN NO. 2

Week of 6/10 to 6/16

Date	*Cause of down-time*	*Down-time*
6/10	Slurry pump clogged	1 hr. 15 min.
6/10	Replace coupling on kiln drive motor	1 hr. 45 min.
6/11	Slurry pump clogged	55 min.
6/11	Tighten coupling on kiln drive motor	10 min.
6/11	Slurry storage filled	25 min.
6/12	Fuel-oil pump not operating	35 min.
6/12	Slurry pump clogged	1 hr. 10 min.
6/13	Tighten coupling on kiln drive motor	15 min.
6/13	Slurry pump clogged	25 min.
6/14	Slurry pump clogged	1 hr. 5 min.
6/15	Tighten coupling on kiln drive motor	15 min.
6/16	Slurry pump clogged	35 min.

Now here is a modest record of down-time amounting to 8 hrs. 50 minutes on No. 2 kiln for the week. The entries refer to the slurry pump clogging, trouble with the coupling on the kiln drive motor, and the fuel pump, since this is an oil-fired kiln. In one instance the kiln was stopped because the slurry storage was filled. Analyzing this down-time, it was noted that 5 hrs. and 25 min. were lost due to the slurry pump clogging, 2 hrs. 25 min. were lost because of the coupling on the kiln drive motor, 25 min. were lost because the slurry storage was filled, and 35 min. were lost because the fuel-oil pump was out of commission.

Each one of these items must be investigated. *Why* does the slurry pump clog up? *Why* is the kiln drive motor coupling coming loose? *Why* did the oil-fuel pump fail? Is the slurry storage inadequate? When it is determined *why* these things happened, it then becomes a question of *how can*

a recurrence be prevented? The answers usually require only a simple engineering corrective.

As this record grows, it will be found that the items fall into clearly defined classifications. The trouble-makers become increasingly apparent. They may show up as a piece of equipment, or as a condition of operation. But they will show up when a record like this is kept.

Sometimes the item as reported on the daily log is misleading. Apparent causes to the operator are not always the actual causes to the investigator. An experience of this sort was met by the author in a coal-fired lime kiln operation. The item "Heating Kiln" occurred so frequently that it became a major cause of down-time. An investigation revealed that this was the apparent reason for the operator stopping the kiln, but back of this was the further reason for the kiln chilling to a temperature where the material produced was not up to the required degree of burning. It was found that lumps of coal clogged the table feeders of the coal mills, and some time elapsed before the operators observed the lack of fuel.

Now these operators had more to do than just keep looking into the kiln all the time, although it was seldom that they delayed observations for intervals longer than fifteen minutes: the log called for an observation and entry every half-hour. So the operators couldn't be censured for this down-time, nor could they be expected to be looking into their kilns all the time. The solution to this problem lay in another direction.

The coal used for fuel was a good grade of mine run bituminous, and the bins over the pulverizers were filled by elevators and chutes that delivered the coal into the center of the bins. When the bin was being filled, the lump coal would roll to the outside against the walls of the bin, leaving the fines in the center. When the bin was emptying, the coarse coal would roll down into the pulverizer feed-pipe and invariably cause trouble by jamming on the feeder table of the pulverizer.

The solution to this problem was found by making the coal in the bin of more uniform size. After the installation of hammer-mills, which crushed the coal to a small size before it was elevated to the bins, the down-time due to the item "heating kiln" practically vanished.

Summary

Down-time can rob the lime-recovery kiln of its many economic advantages. A serious study of the shut-downs in any lime-recovery operation is invaluable, even necessary, for bettering the economy of the operation. When the workmen know what management is taking operating interruptions seriously, they too become interested. More often than not the kiln operators, or the master mechanic, or the foreman, or the plant superintendent, or even a laborer, will offer suggestions for overcoming some difficulty. These humble words must be given every consideration. They should not be accepted and applied blindly. Neither should they be ignored. But when these men learn that engineering management of the lime-recovery plant is giving their suggestions every consideration, and explanations made when their ideas cannot be applied, they appreciate it immensely. They are encouraged to make further offers under such a broad and understanding program. And many an economic and engineering gem has thus been contributed to the cause of better lime-recovery kiln operation.

Management must take the lead. It must provide competent men and must not hesitate to procure competent counsel that will work in harmony with them.

Patent Abstracts

● In addition to abstracts on the technology of pulp, paper and related industries, miscellaneous abstracts which may provide useful information are included.

United States

2,510,004—Telescopic Shipping Carton. Benjamin M. Williams, St. Louis, Mo., assignor to Gaylord Container Corporation, St. Louis, Mo. Filed November 1, 1947 — Issued May 30, 1950.

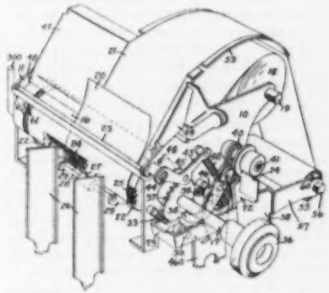
A relatively tall heavy duty shipping carton comprising an upwardly opening lower cover, a separate upright tubular open-ended liner having a height which prevents an average person from reaching through the open upper end of said liner member to the lower portion thereof, said liner comprising separate upper and lower sections of the same cross-sectional size and shape, said lower liner section having a slip-fit in said lower cover and terminating short of the upper end thereof, said upper liner section extending upwardly from said lower liner section with its lower portion slip-fitted in the upper end of said lower cover and seated on the upper end of the lower liner section therein, and a downwardly opening upper cover telescoped over the upper end of said upper liner section with its lower end disposed in abutting relation to the upper end of said lower cover, whereby said carton is adapted to be assembled and packed by first inserting said lower liner section in said upwardly opening lower cover, then filling said lower liner section, then inserting the lower end of said upper liner section in said lower cover, then filling said upper liner section and then applying said downwardly opening upper cover to the upper end of the filled upper liner section.

2,510,595 — Method of Bleaching Groundwood. Robert L. McEwen, Williamsville, and Fred R. Sheldon, Buffalo, N. Y., assignors to Buffalo Electro-Chemical Company, Inc. — Filed September 20, 1946—Issued June 6, 1950.

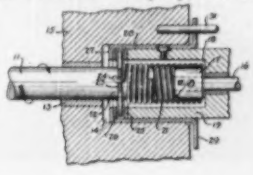
The method of bleaching ground wood fibers which comprises felting the fibers into a web from a water suspension containing such fibers, dewatering the web to a water content of less than about 250% on an oven dry pulp basis whereby the web is self-sustaining and thereafter applying to at least one face of the pulp web sufficient of an aqueous alkaline bleaching solution to produce the desired degree of bleach in the web, said solution consisting of hydrogen peroxide and a soluble phosphate of an alkali metal as the essential ingredients, the latter compound producing a pH therein in the range pH 9.5 to 11.5.

2,510,626 — Paper Feed Device for Printing Business Machines. Charles W. Geisheck, Detroit, Mich., assignor to Burroughs Adding Machine Company, Detroit, Mich. Filed August 20, 1947 — Issued June 6, 1950.

In a paper feeding mechanism for printing business machines having a rotatable platen roller around which a plurality of strips of paper are passed, paper pressing means to press the paper strips into feeding relation to the platen roller, said pressing means being movably mounted for movement toward and away from the platen roller, yieldable means to urge the pressure means toward the platen roller, means to drive the platen roller step by step to feed the paper strips, paper take-up means including means to tension a portion of at least one of said paper strips which has passed around and beyond the platen roller, and means to drive said tensioning means; a member automatically moved by operation of the machine and engaging a portion of said pressing means to move said pressing means away from the platen roller to release said paper strip from feeding relation to the platen roller to permit said tensioning means to move said one of the paper strips relative to the platen roller.



2,510,653—Detachable Coupling. Carl P. Pepper, Plainfield, Ind., assignor, by mesne assignments, to The Marquette Metal Products Company, Cleveland,



Ohio. Filed June 7, 1946—Issued June 6, 1950.

A coupling for detachably connecting a driven shaft to a rotating driving shaft, comprising a helical clutch spring mounted on said driven shaft and extending outwardly therefrom to provide an expansible socket for receiving the end of said driving shaft, said spring socket having a diameter when unstrained such that engagement thereof with the surface of said driving shaft causes said spring to wrap down and contract said socket into engagement therewith to clutch said shafts together, a spring controlling mechanism including a member connected to the end of said spring, and means responsive to movement axially of said driving shaft for engaging said member to resist the rotative movement of said member so as to maintain the spring free from clutching engagement with said driving shaft whereby said coupling can be attached to or detached from said driving shaft during rotation thereof.

2,510,661 — Loading Paper Fibers with Organo-polysiloxane Coated Clay. Moyer M. Safford, Schenectady, N. Y., assignor to General Electric Company. Filed May 6, 1944 — Issued June 6, 1950.

In the process of making a water-repellent paper from paper stock, the improvement for increasing the dispersibility of a normally non-dispersible finely divided paper filler which comprises adding to the water slurry of the paper stock prior to beating the slurry and forming a paper, a paste consisting essentially of (*a*) a finely divided inorganic paper filler the particles of which are coated with a thin water-repellent film of an organopolysiloxane obtained by subjecting the aforesaid particles to the vapors of an organohalogenosilane selected from the class consisting of methylchlorosilanes and azeotropic mixtures of trimethylchlorosilane and silicon tetrachloride, and (*b*) a water-miscible organic liquid.

2,510,668—Method of Converting Woody Substances. Alfred M. Thomsen, San Francisco, Calif. Filed October 8, 1945—Issued June 6, 1950.

The method of saccharifying cellulose to obtain a medium suitable for yeast culture which comprises; commingling a purified form of cellulose, obtained by a preliminary digestion of woody substances with a water solution of alkali metal hydroxide and separation of the soluble products thus obtained, with water in such proportion as shall produce a magma of mobile consistency; heating said magma by the direct admission of steam while in a state of flow to saccharifying temperatures, being from 100° to 180° C. under superatmospheric pressure; acidifying said magma and maintaining same under said saccharifying temperature until a predetermined but partial degree of conversion has been reached; neutralizing the acidity of said magma; releasing the pressure with consequent evolution of relief steam; separating the sugar solution from the unconverted cellulose; and returning the unconverted cellulose to the initial step of the process.

2,510,748 — Preparation of Cold Swelling Starch-Aldehyde Compositions. Jan Lolkema, Hoogezand, and Willem Albertus van der Meer, Haren, Netherlands, assignors to Naamlooze Vennootschap: W. A. Scholten's Chemische Fabrieken, Groningen, Netherlands. Filed November 1, 1946 — Issued June 6, 1950.

A process of manufacturing cold swelling starch preparations, the solutions of which when dried will produce water resistant layers, comprising adding to a starch product a limited quantity of water and at least 10% of an aldehyde, calculated on the weight of the dry starch product, adjusting the mixture to a pH of at least 5 and heating the same on a rotating cylinder to a temperature above the gelatinizing point of starch but not exceeding 140° C., while pressing the mass under mechanical pressure to form a thin layer which is simultaneously dried and subsequently comminuted.

2,510,755 — Purification of Abietic Acid. Arthur Pollak and Henry P. Johnston, Charleston, S. C., assignors to West Virginia Pulp and Paper Company, New York, N. Y. Filed December 19, 1946—Issued June 6, 1950.

In the method of purifying tall oil abietic acid crystals to remove adhering mother liquor containing liquid phase fatty and rosin acids, the step which consists in bringing into intimate contact abietic acid containing fatty acids as an impurity, and a dilute water solution of an alkaline substance which does not form insoluble soaps and which furnishes hydroxyl ions to neutralize free fatty acids present in said liquid phase, separating the purified abietic acid from the attendant aqueous component and washing the abietic acid before sufficient time elapses for the crystals to dissolve in substantial amounts.

Canadian

465,196—Covered Box or Container. Kenneth T. Buttery, Kalamazoo, Michigan, U.S.A., assignor to Sutherland Paper Company, Kalamazoo, Michigan, U.S.A. Filed May 7, 1948 — Issued May 16, 1950.

In a collapsible container, the combination of a body comprising a bottom and front and rear and end walls, the body front having corner flaps extending therefrom, a cover extending from the upper edge of the body rear wall and having cover end and end front walls extending therefrom, the cover front wall having end flaps extending therefrom, the several parts being formed of an integral blank scored to provide hinged connections for the parts, the body end walls having diagonal scored or weakened lines at the front ends thereof providing joint flaps collapsible on the outer sides of the body end walls and to which the corner flaps of the body front wall are secured permitting inward collapsing of the body end and front walls, the cover end walls having diagonal scores or weakened lines at their front ends providing joint flaps collapsible on the other sides thereof and to which the corner flaps of the front cover wall are adhesively secured permitting inward collapsing of the cover end and front wall, the joint flaps of the body end walls having tongues projecting from the end edges thereof, said tongues being cut from the inner edges of the body front wall corner flaps and acting to straiuingly engage the cover front wall when the cover is closed, the corner flaps of the body front wall having lugs projecting from the bottom edges thereof cut from the end edges of the body and wall joint flaps and acting to supportingly engage the bottom for supporting the front wall in vertical position when the container body is erected, the bottom having slits therein positioned at the hinge connection for the body bottom and front wall to receive said lugs when the container body is collapsed.

465,304—Paper Roll Holder. Elvah O. Bulman, Grand Rapids, Michigan, U.S.A., assignor to The E. O. Bulman Manufacturing Company, Inc., Grand Rapids, Michigan, U.S.A. Filed April 23, 1949—Issued May 23, 1950.

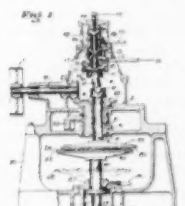
In a paper roll holder, a supporting frame including two spaced apart standards, a base supporting member at the lower end of each standard said standards and base supporting members having parts slightly spaced from each other, means for connecting such standard to its base support including bolts and nuts, the bolts passing through said spaced parts of said standards and supporting members, said parts being yieldingly resistant and sprung towards each other and exerting pressure upon the bolt heads and nuts to prevent relative movement of the bolts and nuts with respect to each other, a transverse bar across the upper ends of the standards, bolts passing through said standards and the upper ends of the bar, said upper ends of the standards having yieldingly resistant portions spaced from the bar deformed by the bolt connections and nuts on the bolts to exert deforming pressure on said yielding portions.

465,344 — Deinking Waste Paper. Francis Leroy Fennell, Niagara Falls, New York, U.S.A., assignor to E. I. du Pont de Nemours and Company, Wilmington, Delaware, U.S.A. Filed March 2, 1948 — Issued May 23, 1950.

A process for deinking waste paper composed of magazine stock containing clay filler which comprises pulping said paper in an aqueous sodium peroxide solution consisting of water, sodium peroxide and caustic soda, and containing an amount of said peroxide equal to at least 0.25 per cent of the dry weight of the paper and having an alkalinity equivalent to at least about 2 per cent by weight of caustic soda based on the dry weight of the paper, to a pulp consistency of about 2 to 15 per cent, maintaining the pulp at a temperature of about 140 to 160° F. for 1 to 2 hours and then screening and washing the pulp sufficiently to remove at least a major portion of the alkali present.

A process for deinking waste paper composed of magazine stock containing clay filler which comprises pulping said paper in an aqueous sodium peroxide solution consisting of water, sodium peroxide and caustic soda, and containing an amount of said peroxide equal to about 1 to 3 per cent of the dry weight of the paper and having an alkalinity equivalent to about 2 to 8 per cent by weight of caustic soda based on the dry weight of the paper, to a pulp consistency of about 2 to 15 per cent, maintaining the pulp at a temperature of about 140 to 160° F. for 1 to 2 hours and then screening and washing the pulp sufficiently to remove at least a major portion of the alkali present.

465,518 — Apparatus for Treating Wood Pulp and the Like. James T. Coghill, Fairport, New York, U.S.A., and Harold S. Hill, Kenogami, Quebec, Canada, assignors to Consolidated Machine Tool Corporation, Rochester, New York, U.S.A. Filed August 6, 1947 — Issued May 30, 1950.



In apparatus for treating paper-making pulp, opposed working surfaces, means for pressing the surfaces toward one another to compress pulp between them, and means for causing the surfaces to roll pulp transversingly between and over the surfaces in different directions perpendicular to the direction of applied pressure while the pulp is under compression, the surfaces being rough to have tractive contact with the pulp.

New Service

Paper and Pulp Testing Laboratories

The Paper and Pulp Testing Laboratories were established to provide testing and consulting services to the paper industry, its consumers and suppliers. This service is available to concerns which can make profitable use of technical information but find it too costly to operate their own laboratory, to large firms with their own well equipped laboratory which may desire corroboratory data, or where disinterested investigation is desired by two parties.

Paper and Pulp Testing Laboratories have been approved by the Certified Pulp Testers Bureau and are available to test shipments of pulp on docks or at the mills.

All tests are made according to TAPPI specifications. An air conditioning room is used where atmospheric conditions are maintained at 50 percent Relative Humidity and 73 degrees Fahrenheit. All physical tests are performed in this room. Fiber analysis is an important part of the work done, as well as chemical tests.

Figure 1. William Landes operating Schopper tensile tester in constant temperature-humidity room.

Figure 2. William Landes making a microscopic examination of woodpulp fibers.

Paper testing is often the first step in an investigation to solve a problem. Recently, a client asked the Laboratory to determine why a competitor's self-sealing wax wrapper had a higher heat seal strength than theirs. Quantitative tests showed no difference in wax content. However, microscopical examinations supported by other physical tests indicated the presence of a micro-crystalline wax in the competitor's product. A well known soap manufacturer asked for help in discovering why a new shipment of a heavily coated soap wrapper cracked when folded on the wrapping machine. The paper supplier claimed that there was no change in the paper and suggested that the trouble might be caused by a new wrapping machine. The soap manufacturer knew there was something wrong with the paper but could not put its finger on the cause. Paper from previous shipments was tried and

Figure 3. Lewis Lubka weighs a sample of paper to obtain basis weight.

Figure 4. William Landes and Lewis Lubka at work on chemical analysis of paper.

found to work satisfactorily on the new wrapping machine. Further investigation showed that the ash content had been increased but the binder had not. An inquiry led to the fact that the paper concern had been asked to increase the mineral pigment content of the coating which it did. However, this change is what caused the trouble, since the original amount of binder or adhesive was insufficient to carry the extra pigment. An increase in the ratio of binder to pigment solved this problem.

Another firm buys large quantities of wastepaper. The percentage of ash and fiber means dollars and cents to them. Knowing whether a stock has a high proportion of bleached stock against unbleached fiber, or a high proportion of sulfite against groundwood is valuable information. One day they were offered waste drinking cup stock at a good price "with only a small amount of wax," according to the seller. The small amount of wax turned out to be so much as to cause the potential buyer plenty of trouble, if he had attempted to use the stock.

A paper manufacturer wanted to know whether an asphalt laminated kraft or a wax laminated kraft gave better moisture protection. By means of a Moisture Vapor Transmission Test, it was found that the wax did the better job in keeping the moisture out.

A bag paper dealer is interested in the complete story on the paper he is buying: basis weight, mullen, tear, tensile, fold, porosity, sizing, etc. Another bag company wanted wet strength tests.

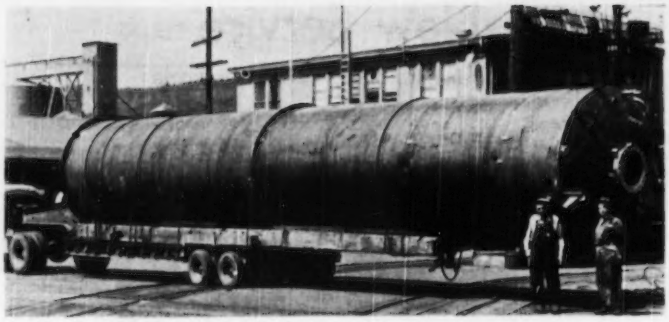
The biggest item carried in stock is "know-how" in the paper trade. The laboratory is operated by William Landes, a 1930 graduate of the Pulp and Paper course at the New York State College of Forestry at Syracuse, N. Y. He is assisted by Lewis Lubka, a 1948 graduate of the same school. Their combined experience covers groundwood, soda, sulfite, and sulfate pulp mills, newsprint, book, bond, specialty, kraft wrapping, and tissue mills. Technical training reinforced by actual mill experience are brought to bear in the solution of paper problems.

The aim of the laboratory is to provide a personalized technical service to satisfy each individual company's needs.

SUPPLIERS

Hercules Powder Co.'s Virginia Cellulose Department has named Elmer F. Hinner general manager. Mr. Hinner succeeds Lloyd Kitchel, who died suddenly on June 30.

Mutual Boiler and Machinery Insurance Co. opened a new office on July 1 in Baltimore, Md., at 2322 North Charles street. The new office will be staffed by W. J. Withers, already stationed in Baltimore as resident inspector, and Edward Daughty, previously inspection engineer for the company at its Toronto, Ontario, office.



Rubber Lined Chemical Storage Tank

Griffith Rubber Mills, Portland, Ore. announce that the largest tank ever to be lined with rubber by their mills, a 12 ton chemical storage tank and another one the same size were lined for the Columbia River Paper Mills, Vancouver, Wash.

Dr. Paul E. Burchfield (left) recently succeeded Carles S. Johnson (right) as director of technical service, Wyandotte Chemicals Corp., Michigan Alkali Division. Mr. Johnson, retiring from active service with the company, will serve Wyandotte Chemicals in an advisory capacity.

General Electric has completed construction of new and expanded repair, maintenance, and warehousing facilities in Salt Lake City. These facilities, located at 301 South Seventh West street, will be used to service equipment for mines, smelters, power companies, and industrial concerns in Utah, Idaho, Montana, and Nevada. They provide approximately 50 percent more warehouse space and more than double the former capacity for service and repair of motors, control devices, generators, transformers, switchgear, and other types of electrical apparatus.

Hercules Powder Co.'s Paper Makers Chemical Department have announced the following new assignments: J. W. Burke has been transferred to technical sales work with headquarters at the company's Kalamazoo, Mich., office; Henry Heller has been transferred to Kalamazoo, where he will be in charge of the technical service laboratory and responsible for the training of technical service personnel; J. Huston McClane has been transferred to the department's Atlanta office, where he will be engaged in paper mill technical sales; Fred L. Schucker has been assigned to the paper mill technical service staff in the Kalamazoo territory; Charles H. Chapman has been transferred from the department's Portland, Ore., office to San Francisco, where he will be engaged in paper mill technical sales work.

General Dyestuff Promotes Horstmann

Henry Horstmann, General Dyestuff Corp., has moved up to manager of the New York sales department. Mr. Horstmann has been connected with Dyestuff Sales and Applications since 1918, covering New York State and parts of northern New Jersey since 1935. He will move to New York City in the Fall.

G. B. Martin will take over duties of Mr. Horstmann, making his headquarters at Syracuse. He is a graduate of New York State College of Forestry, 1927, and brings to the territory 20 years of sales service experience.

Spencer Names Benson

Spencer Chemical Co., Kansas City, Mo., has announced the retention of Dr. Henry K. Benson of Seattle as consultant, specializing in the development of the ammonium bisulphite process for wood pulping. . . . According to John R. Riley, Jr., general sales manager, "Spencer Chemical Company has been challenged by the great advantages offered to the wood pulping industry by the ammonium bisulphite process. But many questions remain unanswered, and we want to participate actively in the developmental work. In Dr. Benson, we believe we have secured the outstanding chemist in this field. His findings will be freely distributed to the entire industry.

Bathurst Power & Paper Co., Ltd., has declared a dividend of 50 cents a share on Class "A", payable September 1 to stockholders of record August 4.

Kimberly-Clark has announced quarterly dividends of $1.125 per share on 4½ percent preferred stock, $1 per share on 4 percent convertible second preferred stock, and 45 cents per share on common stock, payable to stockholders of record June 9, 1950.

Rolland Paper Co., Ltd., has declared a dividend of $1.06¼c per share on preferred stock, payable September 15 to stockholders of record September 1.

Millers Falls Paper Co. has voted two regular quarterly dividends of 50 cents a share. One dividend is payable August 10 to stockholders of record August 1. The second dividend is payable on November 10 to stockholders of record November 1. The directors also voted to pay the hourly workers a profit-sharing payment on their straight time earnings during the period from July 1, 1949, to January 1, 1950. This distribution replaces a Christmas bonus that in past years was paid the employes. This profit sharing plan will be continued in the future when earnings for a six months' period justify.

British Columbia Pulp and Paper Co., Ltd., has declared a dividend of $1.75 per share for the quarter ending July 31, 1950, on 7 percent cumulative redeemable preference shares, payable August 1 to stockholders of record July 15.

Eddy Paper Co., Ltd., has declared a dividend of 25c on Class "A" stock, payable September 15 to stockholders of record August 16.

Pacific Mills Ltd., operating pulp and paper and paper processing plants at Ocean Falls and Vancouver, B. C., made a net profit of $3,365,307 for the year ending April 30, 1950. This was $82,012 above the 1949 figure.

Net income per ordinary share was $10.82 against $10.54 the previous year.

Total taxes were $3,133,306, a jump of $466,385 over the 1949 figure.

Working capital increased to $10,896,000 from $8,420,778.

The company paid $119,934 in preference dividends, and $1,200,000 in ordinary dividends for a total of $1,319,934, against $869,934 in the preceding period.

Sales were $22,464,408 compared with $20,440,933.

By weight, tonange was: Newsprint, 86,872 (1949 = 87,266); kraft and manila paper, 25,829 (31,512); liner and corrugating, 18,339 (18,672); specialty papers, 6044. No pulp was sold, but 4612 tons were sold in 1949.

FINANCIAL RECORD

PREFERRED STOCKS	Per Share Earnings: Calendar Year 1949	Per Share Earnings: 12 Mo. to Approx. 3/31/50	Indic. Annual Divid. Rate	July 11 Approx. Market Price
Armstrong Corp Co. $3.75 Cum.	$40.95*	$ —	$3.75	$102¾
Armstrong Cork Co. $4.00 Cum. Conv.	40.95*	—	4.00	112¾
Celotex Corp. 5% Cum.	6.80c	8.27g	1.00	16½
Champion Paper & Fibre $4.50 Cum.	60.09f	87.66	4.50	105½
Container Corp. of Amer. 4% Cum.	89.52	$92.76	4.00	105½
Crown Zellerbach $4.20 Cum.	54.38c	—	4.20	103¾
Dixie Cup Co. $2.50 Cum. Conv. Cl. A	10.93	11.41	2.50	50½
Flintkote Co. $4 Cum.	62.70	65.47	4.00	106¾
Robert Gair Co., Inc. 6% Cum.	11.48	8.49	1.20	17¼
International Paper Co. $4 Cum.	224.55	235.34	4.00	107½
Kimberly Clark Corp. 4½% Cum.	85.27	99.12	4.50	107½
Kimberly Clark Corp. 4% Cum. Conv. 2nd	50.65*	58.80	4.00	135½
MacAndrews & Forbes 6% Cum.	61.59	61.09	6.00	140
Mead Corp. 4¾% Cum.	51.37	53.61e	4.25	86½
Mead Corp. 4% Cum. Conv. 2nd	21.35*	22.62*e	2.00	42½
Paraffine Cos. Inc. 4% Cum. Conv.	56.46	47.70	4.00	99¾
Rayonier Inc. $2 Cum.	9.54	10.03	2.00	32¾
St. Regis Paper Co. 4.40% 1st A	30.74	30.19	4.40	87½
Scott Paper Co. $3.40 Cum.	51.15*	56.23*	3.40	99½
Scott Paper Co. $4.00 Cum.	51.15*	56.23*	4.00	108
Sutherland Paper 4¼% Conv.	46.92	50.62	4.25	104¾
U. S. Gypsum Co. 7% Cum.	283.37	300.73	7.00	183
United Wallpaper Inc. 4% Cum. Conv.	2.14	(d)8.00	2.00	24½
West Virginia Pulp & Paper 4½% Cum.	61.28e	—	4.50	109¾
COMMON STOCKS				
APW Products Co.	(d)0.81	(d)0.58	—	4⅞
American Writing Paper Corp.	.04	$0.15	—	7
Armstrong Cork Co.	6.57	—	$3.00	46⅞
Celotex Corp.	1.65e	2.06g	1.00	14⅞
Certain-Teed Prods. Corp.	2.84	3.00	1.00	12¾
Champion Paper & Fibre	5.15f	7.55	2.00	33⅝
Congoleum Nairn Co.	3.04	—	2.00	23¾
Container Corp. of America	8.46	8.77	4.00	44
Crown-Zellerbach	6.02e	—	2.00	32¾
Dixie Cup Co.	7.44	7.85	1.50	36½
Eastern Corp.	0.04	0.87	—	13¾
Flintkote Co.	4.33	5.52	2.50	24½
Robert Gair Co., Inc.	1.31†	1.22†	0.70	7¾
Great Northern Paper Co.	4.87	4.19	2.80	40¾
International Paper Co.	7.12	7.47	2.50	41¾
Johns-Manville Corp.	4.83	5.15	2.50	41¾
Kimberly Clark Corp.	5.29	6.19	1.80	33½
MacAndrews & Forbes Co.	3.64	3.61	3.00	37½
Marathon Corp.	3.29c	3.56g	1.40	29¾
Mead Corp.	4.10	4.28e	1.60	19⅞
National Container Corp.	0.95	1.08	0.60	7¾
Paraffine Cos. Inc.	0.85	0.71	0.60	13½
Rayonier, Inc.	4.75	5.06	2.00	32½
Ruberoid Co.	8.72	9.44	3.25	49
St. Regis Paper Co.	0.91	0.87	0.60	7⅞
Scott Paper Co.	6.07	6.65	3.60	85¾
Sutherland Paper Co.	4.62	4.88	2.50	37¾
Union Bag & Paper Corp.	5.01	5.12	2.25	28¾
United Board & Carton	(d)1.61b	(d)0.84g	—	9⅝
U. S. Gypsum Co.	13.51	14.35	9.00	100½
United Wallpaper	(d)0.01	(d)0.32	—	2⅜
West Virginia Pulp & Paper	8.58c	9.37g	3.00	48

(a) 12 months to approximately 2/4/50
(b) Year ended 11/13/49
(c) Year ended 1/31/50
(d) Deficit
(e) 12 months to 3/19/50
(f) 9 months to 12/31/49
(g) 12 months to approximately 4/30/50
(*) Earnings per combined preferred shares.
(†) Not including full earnings of Gair Co., Ltd. nor 60% interest of Robert Gair Co., Inc. in Southern Paperboard Corp.

St. Lawrence Corp., Ltd., has declared a dividend of 50c per share on outstanding first cumulative convertible preferred shares and another dividend of 18¾c on outstanding second cumulative preferred shares, both payable July 25 to stockholders of record July 10.

Gair Co. of Canada Ltd. has declared a dividend of $1 per share on preferred stock, payable September 1 to stockholders of record August 14.

Canada Increases Pulp Production

OTTAWA — Canadian production of mechanical and chemical woodpulp advanced during the first four months of 1950 compared with a year ago in the corresponding period, according to official sources here, with mechanical pulp rising to 1,559,600 tons compared with 1,463,800 tons last year and chemical pulp increasing to 1,001,500 tons as against 994,800 tons a year ago. Total pulp exports in this period increased to 527,900 tons compared with 505,000 last year in same period.

PRICES

The prices below reflect general market quotations at the mill level on the standard grades in which the normal volume of business is being done. Does not include occasional spot offerings.

NEW YORK

Delivered Ports

Standard News, per ton—

Rolls, contract	$100.00/	—
Sheets	115.00/	—

F.o.b. Mills. Carload freight allowed, dock N. Y.

Kraft— per cwt., 40# base wgt.

Standard Wrapping Rolls	$6.50/	—
No. 1 Wrapping Rolls	7.25/	—
Standard Bag	6.25/	—

Tissues—per ream 24x36 (480) 10 lbs. 2500 lbs. or more

Wh. No. 1 Frd.	‡ $1.40 /	1.55
Wh. No. 1 MG	‡ 1.40 /	
Wh. No. 1½	‡ 1.30 /	1.35
Wh. No. 2	‡ 1.15 /	1.20
Kraft Non-Tar	‡ 1.25 /	
White Non-Tar	‡ 1.52½ /	

‡ Pricelists withdrawn by mills. Refer to *Trends*.

Toilet— per case of 100 rolls—1 M sheets.

Unbleached 4½x4½	$5.75/	—
Bleached 4½x4½	6.95/	—
Bleached 4½x5	8.80/	—
Per Case of 50 rolls—2000 sheets		
Unbleached 4½x4½	$5.75/	—
Bleached 4½x4½	6.80/	—
Per Case of 100 rolls—1000 sheets		
Facial, 4½ x 5, 2 ply	$8.95/$9.45	

Paper Towels—per case of 3750.

Wh. Jr. M'tif'd 9¼x9½	$5.25
Br. Sr. M'tif'l 10x12	3.60
Br. Jr. M'tif'd 9½x9¾	3.10
Br. Jr. Sgl. fold 10x10¾	3.15
Blchd. 7½ x 11, 24/25 rolls	$3.95/$6.25

Manila, per cwt.

No. 1 Jute Tag sheets*	$15.05/	$17.50
Reg. Jute M.F. 40-lb., sheets*	13.50/	15.50
Wrapping Manila	8.75/	10.50
Printing Manila	10.00/	11.00

* Less usual allowance for rolls.

WORLD WOOD PULP MARKETS

Third Quarter Contract Price, Per Short Air-Dry Ton

Delivered, with varying freight allowance

	U. S.	Canadian	On dock Atlantic Ports: Swedish	Finnish	Norwegian
Groundwood	$65.00/ —	$65.00/ —			
Siderurs Pulping News	65.00/ —	65.00/ —			
Soda, Bleached	120.00/122.00	122.00/ —			
Sulphate, Bleached	122.00/137.50	131.00/ —	*130.00/137.00†		*129.00/ —
Sulphate, Unbl'd North'n		95.00/105.00	*90.00/ 97.50†		
Sulphate, Unbl'd South'n	90.00/ 95.00			* In	
Sulphite Blchd. (S'ftw'd)	122.00/125.00	125.00/ —	*125.00/128.00†	Competitive	Competitive
Sulphite, Blchd. (H'dw'd)	120.00/ —			range	
Sulfite, Semi-blchd.	112.00/ —				
Sulphite, Unbleached		107.00/ —	107.00/110.00†		
Sulphite, Unbl'd (Glassine)		110.00/ —	111.00/ — †		

* On dock. † Delivered.

Gummed Tape—per bdl., 500 bdls. or more.

60-lb. 600 ft. GSI	$ 5.25/$ 5.40
35-lb. 800 ft. GSI	6.05
35-lb. 500 ft. GSI	4.66
35-lb. 500 ft. GSO	4.53

Boards, per ton—*

Filled News	‡ $72.50/
Plain Chip	‡ 70.00/ —
Blchd. Mla, L-d. Chip	‡ 102.50 —
White Pat. coated	‡ 115.00/120.00
Kraft Liners 42 lb.	100.00/
Kraft Corr. 009	105.00/
Binders Boards	110.00/116.00

* Base Prices per 10 tons. Less than 10 ton but over 3 tons, add $2.50; three tons or less, add $5.

The following prices are representative distributors' resale prices:

Rag Content Bonds and Ledgers—
White, 20 lb.

Bonds	4 Ctns. per cwt.
100% Rag Ex. No. 1	$54.45/ $5.55
100% Rag	47.05/ 47.55
75% Rag	35.15/ 36.80
50% Rag	29.40/ 30.35
25% Rag	25.75/ 26.75

Ledgers	4 Ctns. per cwt.
100% Rag Ex. No. 1	$55.70/$57.60
100% Rag	48.30/ 48.90
75% Rag	37.65/ 38.05
50% Rag	30.70/ 31.70
25% Rag	27.15/ 28.05

Sulphite Bonds and Ledgers
White, 20 lb.

Bonds	4 Ctns. per cwt.
Watermarked	‡ $17.55/18.35
Plain	‡ 16.40/16.90

Ledgers	4 Ctns. per cwt.
Watermarked	‡ $18.85/19.65
Plain	‡ 18.00/18.05

White Book

Conversion Coated	Case
No. 1	‡ $20.25/21.65
No. 2	‡ 19.75/20.40
No. 3	‡ 18.25/19.65
Machine Coated	
No. 1	‡ 16.65/16.90
No. 2	‡ 14.65/15.40
Uncoated	
No. 1 Antique (Watermarked)	‡ 16.90/18.40
Offset	‡ 16.15/16.90
A Grade E. F.	‡ 16.00/16.15
A Grade S. C.	‡ 16.40/16.65
B Grade E. F.	‡ 15.15/15.40
B Grade S. C.	‡ 15.65/15.90

‡ Indicates a price change.

WASTE PAPER MARKET

The following quotations were gathered from major dealers in each market. They are an indication of the price range in which volume tonnage was moving on the date specified. Spot offerings or special packings are not necessarily included. Prices to mills, per ton, f.o.b. cars shipping point (includes brokers' fee.)

	New York July 10	Philadelphia July 10	Boston July 7	Chicago July 7
No. 1 Mixed Paper	$9.00/ 12.00	$10.00/ 12.00	$8.50/ 9.00	$12.00/ —
Boxboard Cuts	10.00/ 13.00	8.00/ 9.00	7.00/ 9.00	15.00/ —
Mill Wrappers	13.00/ 16.00	13.00/ 14.00	8.50/ 10.00	14.00/ —
No. 1 News	11.00/ 14.00	11.00/ 12.00	11.00/ 12.00	15.00/ —
Over-issue News	13.00/ 14.00	13.00/ 15.00	12.00/ 14.00	18.00/ —
Corrugated Containers	23.00/ 26.00	21.00/ 22.00	20.00/ 21.00	21.00/ —
New Corrugated Cuts	20.00/ 21.00	22.00/ 23.00	20.00/ 23.00	25.00/ —
Double Kraft Ld. Corr. Cuts	35.00/ 37.00	37.00/ 40.00	36.50/ 40.00	50.00/ —
Used Kraft Bags	30.00/ 34.00	30.00/ 35.00	25.00/ 30.00	35.00/ —
No. 1 Brown Kraft Paper	32.00/ 35.00	35.00/ 38.00	25.00/ 35.00	35.00/ —
Super Resorted Br. Kraft	45.00/ 50.00	40.00/ 45.00	35.00/ 40.00	45.00/ —
New Br. Kraft Env. Cuts	70.00/ 75.00	65.00/ 70.00	65.00/ 70.00	70.00/ —
New Br. Kraft Cuts	55.00/ 60.00	60.00/ 62.00	50.00/ 55.00	65.00/ —
No. 1 Glwd. Shvs.	25.00/ 30.00	25.00/ 30.00	30.00/ 35.00	30.00/ —
White Newsblanks	55.00/ 60.00	55.00/ 60.00	50.00/ 60.00	50.00/ —
No. 1 Flyleaf Shvs.	27.50/ 30.00	28.00/ 32.00	40.00/ 50.00	40.00/ —
No. 1 Soft Wht. Shvs.	75.00/ 80.00	70.00/ 80.00	65.00/ 70.00	75.00/ —
Super Soft Wht. Shvs.	110.00/115.00	85.00/ 90.00	85.00/ 95.00	85.00/ —
Hd. Wht. Shvs.	95.00/100.00	90.00/100.00	85.00/100.00	95.00/ —
Hd. Wht. Env. Cuts	110.00/115.00	110.00/120.00	100.00/115.00	105.00/ —
New Manila Env. Cuts	65.00/ 70.00	80.00/ 85.00	60.00/ 70.00	60.00/ —
Col. Tab Cards	40.00/ 42.50	42.50/ 45.00	35.00/ 45.00	40.00/ —
Manila Tab Cards	70.00/ 75.00	70.00/ 75.00	60.00/ 70.00	70.00/ —
No. 1 Mixed Ledger	35.00/ 40.00	35.00/ 40.00	33.00/ 37.50	40.00/ —
White Ledger	55.00/ 60.00	50.00/ 55.00	40.00/ 50.00	47.00/ —
Mixed Books & Mags.	13.00/ 15.00	14.00/ 16.00	12.00/ —	15.00/ —
No. 1 Rep'd Hvy. Books & Mags.	25.00/ 30.00	22.00/ 25.00	24.00/ 28.00	28.00/ —

* f.o.b. or delivered.

Rag Market

New Domestic Cotton Cuttings
(Prices to Dealers, F.o.b. Ship. Pt.)

	Per 100 lbs.
White Shirt	$10.75/ $11.50
Unbleached Muslin	10.75/ 11.50
Light Silesias	6.75/ 7.25
White Back Blue Overalls	6.75/ 7.00
Blue Overalls	4.50/ 5.00
Fancy Shirt	4.75/ 5.00
Percales	6.00/ 6.25
Light Prints	3.25/ 3.75
No. 1 Washables	2.75/ 3.00
Bleachable Khaki	4.50/ 5.00
Unbleachable Khaki	3.75/ 4.50
Cottonades	4.00/ 4.75
Lt. Flannelettes	7.00/ 7.50
Men's Corduroy	3.25/ 3.75
Women's Corduroy	2.75/ 3.25
Canton Flannels, Blchd.	8.75/ 9.25
Underwear Cutters, Blchd.	10.50/ 11.00
Underwear Cutters, Unblchd	10.25/ 10.50

Old Domestic Cotton Rags
(Prices to Dealers, F.o.b. Ship. Pt.)

	Per 100 lbs.
No. 1 Whites, Repacked	$4.25/ $4.75
No. 1 Whites, Miscellaneous	3.00/ 3.50
No. 2 Whites, Repacked	3.00/ 3.25
No. 2 Whites, Miscellaneous	2.75/ 3.00
Cotton Pants & Overalls	2.25/ 2.75
Thirds and Blues, Repacked	2.25/ 2.50
No. 1 Roofing Rags	1.20/ 1.30
No. 2 Roofing Rags	1.10/ 1.20
No. 3 & 4 Roofing Rags	1.00/ 1.10
Roofing Bagging	1.00/ 1.10

New Foreign Cotton Cuttings
(Prices to Mills, F.o.b. Dock, N. Y.)

	Per 100 lbs.	
New Dark Cuttings	$2.75/	$3.00
New Mixed Cuttings	2.75/	3.00
Light Silesias	6.50/	7.00
Light Flannelettes	5.50/	6.00
New White Cuttings	10.00/	10.50
New Unbleached Cuttings	10.00/	10.50
fancy Shirt Cuttings	4.50/	4.75
Light Prints	4.00/	4.25
Bleachable Khaki, No. 1	4.25/	4.50
Unbl. Khaki, No. 1	3.50/	4.00

Old Foreign Rags
(Prices to Mills, F.o.b. Dock, N. Y.)

	Per 100 lbs.	
No. 1 White Cottons	$6.50/	$7.00
No 2 White Cottons	5.50/	6.00
No. 3 White Cottons	3.50/	4.00
No. 4 White Cottons	3.00/	3.50
Extra Light Prints	4.50/	5.00
Old Light Prints	4.00/	4.25
Med. Light Prints	2.50/	2.75
Dutch Blue Cottons	3.25/	3.50
Checks and Blues	2.75/	3.00
Linsey Garments	2.10/	2.40
Dark Cottons, European	2.00/	2.10
Dark Cottons, Egyptian	1.85/	2.00
Old Shopperies	1.75/	1.85
New Shopperies	2.00/	2.25

Bagging
(Prices to Dealers, f.o.b. N. Y.)

	Per 100 lbs.	
Foreign Gunny	$5.50/	6.00
Domestic Gunny, No. 1	5.50/	6.00
Heavy Wool Tares	6.00/	6.25
Foreign Manila Rope	4.00/	4.25
Domestic Manila Rope	5.00/	5.25
Jute Strings	5.50/	5.75
No. 1 Sisal Strings	3.00/	4.00
Mixed Strings	Nominal	
Paper Mill Tares	3.50/	4.00
No. 1 Scrap Burlap		
Foreign	4.00/	6.25
Domestic	4.75/	5.00
Austr. Wool Pouches	—/	6.00
New Burlap Cuttings	5.50/	6.00

MATERIALS

Aluminum, sulfate:
comi. bags, wks.....cwt. 1.50
iron free 2.75

Alcohol, ethyl:
tax free, dms. c.l.....gal. .45
deld. East Miss.

Casein, acid-prec.:
dom. sh. pt. c.l. .....lb. .21 .24
imp. ex-dock .....lb. .21½/ .22½

Caustic soda:
c.l. wks. solid, 76%, cwt.... 3.20
flak. & grd. 100-lb. drums.... 3.60
liquid 50% tanks.... 2.40
liquid 70% tanks.... 2.50

China clay:
dom. air-float. filler, c.l. wks.
ton 10.00
water-washed 11.00
coating ..... 16.30 /30.00
imported, ex whse...short ton 15.20 /28.35

Chlorine:
single-unit tanks, works..cwt. 2.55
multi-unit ..... cwt. 3.05 / 4.25

Formaldehyde:
USP, inh. dms. c.l. wks....lb. .0570
l.c.l. E. wks ..... .0620

Fuel oil:
Bunker C, No. 6 Cal. hvy
tanks, refinery .....bbl. 1.25 / 1.55
light .....bbl. 1.65 / 2.10

Hydrogen peroxide:
USP, 35% cbys. E of Miss.
lb. .23½

Lime:
hydrated, bags, wks. Buffalo
ton 13.50

Rosin.
B gum, drms. c.l. Savan. cwt. 4.10
G. gum, do ..... cwt. 5.07
H, I, K, guns, do ..... cwt. 5.26
FF wood, do.....cwt. 4.60

Rosin size:
70%, gum & pale grds, tank
cars, south, sh. pt.....cwt. 4.45 / 4.75

Salt cake:
dom. bulk, c.l. contract del'd
ton 18.00 /20.00
wks. frt, all .....ton 22.00 / —

Soda ash:
light, 58%, bags, wks....cwt. 1.35
bulk .....cwt. 1.10

Sodium silicate 40°:
turbid, c.l. wks.....cwt. 1.10
l.c.l. wks. ..... 1.30 / 1.40

Sodium peroxide:
dms. c.l. E. of Miss.....lb. .18
l.c.l. do .....lb. .18½/ .19

Sulfuric acid:
60° Be. cbys. c.l. .....cwt. 1.40
E. wks.
l.c.l. .....cwt. 1.80 / 2.50

Sulfur:
crude c.l mines, contract,
long ton 18.00
f.o.b. vessels Gulf 19.50
Export, f.o.b. Gulf 22.00

Starches
pearl corn, bags, c.l. Chic. cwt. 5.27 / —
white dextrines, c.l. Chic. cwt. 6.54 / —
potato, Idaho, c.l. wks...cwt. 5.00 / —
potato, Maine, c.l. wks.....cwt. 5.50 / —
tapioca, conv. dextrines—cwt. 6.75 / 7.50
medium grds. Gulf ports..... 6.25 / 6.50
low, Siam, on dock NY ..... 4.25 / 5.25

Talc:
domestic, 50-lb. sacks, c.l.
wks. .....ton 23.00 /28.00

Titanium dioxide:
anastase, c.l. deld., bags..lb. .19½
l.c.l. deld. .....lb. .20
rutile, c.l. deld. .....lb. .21¼
l.c.l. deld. ..... lb. .22½

N.B.: For special market conditions, see *Trends*.

IMPORTS

IMPORTS AT NEW YORK
Week Ending July 8

Newsprint
News Syndicate Co., Elin Hope, Baie Comeau, 7512 rolls.
Bowater Paper Co., Cornerbrook, Cornerbrook, 2310 rolls.
Montmorency Paper Co., Basis, Botwood, 4598 rolls.
(——), G.T.D., Donnacona, 346 rolls.
H. C. Craig Co., A.C.D., Donnacona, 370 rolls.
H. C. Craig Co., Newscarrier, Donnacona, 353 rolls.
R. A. Olsen, Donpaco, Donnacona, 368 rolls.
H. C. Craig Co., G.D.D., Donnacona, 355 rolls.
News Syndicate Co., Ethel Tombs, Gatineau, 310 rolls.
R. A. Olsen, Kermic, Donnacona, 318 rolls.
News Syndicate Co., Ted, Thorold, 2259 rolls.
News Syndicate Co., Mimi, Thorold, 1953 rolls.

Photo Paper
Alco Photo Supply Corp., Catonia, Southampton, 8 cs.
Eastman Kodak Co., Siboney, Havana, 22 cs.
J. J. Gavin Co., Queen Elizabeth, Southampton, 6 cs. (unsensatized).
Alco Photo Supply Corp., Queen Elizabeth, Southampton, 23 cs.

Brown Paper
Price & Pierce, Ltd., American Manufacturer, Dublin, 109 rolls.

Gummed Paper
B. F. Drakenfeld & Co., American Manufacturer, Liverpool, 47 cs.

Paperhangings
C. A. Haynes & Co., American Manufacturer, Liverpool, 70 bls.

Sulphite Paper
B. M. Heede, Oslofjord, Oslo, 12 bls.

Surface Coated Paper
Gevaert Co. of America, Akkrumdyk, Antwerp, 9 cs.
Gevaert Co. of America, American Judge, Antwerp, 50 cs.

Parchment
Inter-Maritime Forwarding Co., Queen Elizabeth, Southampton, 2 cs.

Printing Paper
Oxford University Press, American Manufacturer, Liverpool, 26 cs.

Baryta Coated Paper
Lep Transport, Inc., American Flyer, London, 24 rolls.

Wallpaper
C. A. Haynes & Co., American Manufacturer, Liverpool, 15 ctns.
S. K. Lonergan, Stockholm, Gothenburg, 91 bxs.
(——), Ile de France, Havre, 4 cs.

Filter Paper
H. Reeve Angel & Co. Inc., American Flyer, London, 15 cs.
Fouzera & Co., Dontront, Bordeaux, 17 cs., 15 bls.

Drawing Paper
H. Reeve Angel & Co. Inc., American Flyer, London, 1 cs.
E. de Vries Co., American Flyer, London, 4 cs.

Tracing Paper
Lep Transport, Inc., American Flyer, London, 4 rolls.

Writing Paper
H. W. Robinson Co., American Flyer, London, 1 cs.
R. Howe, Havmann, Hamburg, 34 cs.
L. Bandberger & Co., Ile de France, Havre, 1 cs.
(——), Ile de France, Havre, 1 cs.

Cardboard
Intramarine Transport Co., American Judge, Rotterdam, 27 cs.

Crepe Paper
Brundage Merchandise Co., American Judge, Rotterdam, 27 cs.

Transparent Paper
(——), Ile de France, Havre, 4 cs.

Rags, Baggings, etc.
Castle & Overton, Inc., Robert Maersk, Antwerp, 74 bls. jutewaste.
A. de Vries Trading Corp., Robert Maersk, Antwerp, 79 bls. scrap bagging.
A. W. Fenton Co., Robert Maersk, Antwerp, 74 bls. scrap bagging.
A. Siegle Corp., American Manufacturer, Manchester, 192 bls. jute waste.
E. J. Keller Co. Inc., American Manufacturer, Manchester, 41 bls. bagging.
Penn Wool Co., American Manufacturer, Manchester, 7 bls. clips.
C. Comiter, Hoegh Silvercrest, Bombay, 100 bls. cotton waste.
Royal Manufacturing Co., Hoegh Silvercrest, Bombay, 100 bls. cotton waste.
Lush Cotton Products Co., Hoegh Silvercrest, Bombay, 200 bls. cotton waste.
Brandwein Mazur Co., Hoegh Silvercrest, Bombay, 100 bls. cotton waste.
A. de Vries Trading Corp., American Victory, Antwerp, 69 bls. scrap bagging.
E. J. Lang, American Flyer, London, 89 bls. old jute bagging.
N. Schwab, Titania, Hong Kong, 102 bls. cotton waste.

A. de Vries Trading Corp., Algonquin Victory, Antwerp, 69 bls. scrap bagging.
Cowa Trading Co., Algonquin Victory, Antwerp, 57 bls. cotton waste.
(——), Algonquin Victory, Antwerp, 52 bls. flaxwaste.
Chase National Bank, Algonquin Victory, Antwerp, 146 bls. cotton waste.
C. Aschner, Algonquin Victory, Bremen, 15 bls. cotton waste.
(——), Exochorda, Alexandria, 90 bls. old hessians, 35 bls. old bagging.
(——), Exochorda, Leghorn, 69 bls. bagging.
Midwest Waste Materials Co., Exochorda, Genoa, 4 bls. old nylon stockings.
Castle & Overton, Inc., Exochorda, Genoa, 67 bls. jute rags.
National City Bank, Exochorda, Marseilles, 61 bls. rags.
Darmstadt Scott & Courtney, Exochorda, Marseilles, 113 bls. old bagging.
A. W. Fenton Co., Exorchorda, Marseilles, 172 bls. scrapbagging.
A. W. Fenton Co., Havmann, Antwerp, 237 bls. jute waste.
A. Waldman, Havmann, Rotterdam, 56 bls. rags.
Castle & Overton, Inc., Havmann, Rotterdam, 67 bls. jute rags.
H. Charin Corp., Havmann, Rotterdam, 120 bls. jute waste.
A. A. Rozendaal, Havmann, Rotterdam, 41 bls. bagging.
National City Bank, Havmann, Rotterdam, 116 bls. jute bagging.
Cowa Trading Co., Havmann, Bremen, 65 bls. cotton waste.
New England Waste Co., Domfront, Bordeaux, 106 bls. cotton waste.
A. de Vries Trading Corp., Domfront, Bordeaux, 70 bls. rags.

IMPORTS AT ALBANY

Week Ending July 8

Price & Pierce, Ltd., Paraguay, Wallvik, 4080 bls. dry woodpulp.
Cellulose Sales Co., Paraguay, Ostrand, 600 bls. kraft sulphate pulp, 2250 bls. dry sulphite pulp.
Cellulose Sales Co., Paraguay, Obbola, 1225 bls. dry sulphate pulp.
Cellulose Sales Co., Paraguay, Munksund, 300 bls. kraft sulphate pulp.
Cellulose Sales Co., Paraguay, Kramfors, 450 bls. sulphate pulp, 918 bls. sulphite pulp.

IMPORTS AT NEWARK

Week Ending July 8

Price & Pierce, Ltd., Marna Dan, Clark City, 584 bls. ground woodpulp.
Clifton Paper Board Co., Marna Dan, Clark City, 3900 bls. ground woodpulp.
U.S. Paper Mills, Marna Dan, Clark City, 775 bls. ground woodpulp.
Morculus Manufacturing Co., Marna Dan, Clark City, 1756 bls. ground woodpulp.
Riegel Paper Co., Marna Dan, Clark City, 446 bls. unbleached sulphite pulp.
Delaware Pulp Co., Marna Dan, Baie Comeau, 4098 bls. unbleached sulphite pulp.
Cellulose Sales Co., Paraguay, Ostrand, 150 bls. kraft sulphate pulp, 1765 bls. sulphite pulp.
Cellulose Sales Co., Paraguay, Obbola, 840 bls. dry sulphate pulp.
Cellulose Sales Co., Paraguay, Munksund, 600 bls. kraft sulphate pulp.
Cellulose Sales Co., Paraguay, Kramfors, 1050 bls. sulphite pulp.

IMPORTS AT PHILADELPHIA

Week Ending July 8

International Packing Commercial Co., African Endeavor, Capetown, 670 bags casein.
E. J. Keller Co. Inc., Robert Maersk, Rotterdam, 175 bls. bagging.
D. Galloway, Domfront, Dunkirk, 109 bls. jute bagging.
A. Giese & Son, Domfront, Bordeaux, 17 bls. filter paper.

IMPORTS AT NORFOLK

Week Ending July 8

E. J. Keller Co. Inc., Robert Maersk, Rotterdam, 69 bls. bagging.
E. de Vries, Robert Maersk, Rotterdam, 63 bls. scrap bagging.
E. Butterworth & Co. Inc., American Manufacturer, Manchester, 163 bls. old bagging.
A. de Vries Trading Corp., Domfront, Dunkirk, 74 bls. gunny bagging.

IMPORTS AT BOSTON

Week Ending July 8

Stone & Downer Co., American Manufacturer, Liverpool, 7 drums gummed paper.
J. A. Conkey, American Manufacturer, Liverpool, 32 cs. gauze carbonizing tissue paper.
E. Butterworth & Co. Inc., American Manufacturer, Manchester, 81 bls. new cuttings.
Leigh Textile Co., American Miller, Havre, 71 bls. cotton waste.
Hollingsworth & Vose Co., Paraguay, Copenhagen, 145 bls. old rope.
Cellulose Sales Co., Paraguay, Munksund, 4602 bls. kraft sulphate pulp.
Pulp & Paper Trading Co., Paraguay, Kramfors, 302 bls. 2nd quality strong sulphite pulp.
Cellulose Sales Co., Paraguay, Ostrand, 600 bls. kraft sulphate pulp.
Cellulose Sales Co., Paraguay, Obbola, 1225 bls. dry sulphate pulp.
Price & Pierce, Ltd., Paraguay, Wallvik, 5100 bls. dry woodpulp.
Hill & Cutter, Exochorda, Genoa, 108 bls. cotton waste.
Cowa Trading Co., Exochorda, Genoa, 50 bls. cotton waste.
Green Textile Associates, Exochorda, Genoa, 50 bls. cotton waste.
J. Gorvers, Corona, Havana, 177 bls. gluestock.
(——), American Judge, Amsterdam, 48 bls. colored thread waste.

IMPORTS AT BALTIMORE

Week Ending July 8

Green Textile Associates, Hoegh Silvercrest, Bombay, 400 bls. cotton waste.

NEW LITERATURE

Titanium Pigment Corp., Booklet, "Titanox Pigments — Properties and Uses." A new and complete guide for Titanox users with charts and illustrations.

National Tool Co. Pamphlet, "The Pocket Comparator." Explains the principles of this optical measuring instrument for inspecting small parts. Suggests applications for general use, tool room use and production checking.

U.S. Dept. of Commerce, Office of Technical Services. PB 100 358, 116 pp. including tables and drawings, price $4.75 in microfilm, $15 in photostat, "Artificial Fibers and Allied Fields." A 1949 survey of technology in the Japanese artificial fiber and allied industries. Prepared by an investigator from the Republic of the Philippines, survey covers viscose rayon, polyvinyl and polyamide synthetic fibers, ramie, pulp and paper production, rayon machinery and equipment, high pressure hydrogenation, and textile research. The review of pulp and paper processes covers sulfite, semi-chemical, and sulfate pulp, as well as paper yarn and cigarette paper. Gives production techniques and physical properties for Kuravilon (polyvinyl alcohol), Amilon (polyamide resin) and bast (ramie) fibers.

Superintendent of Documents. Book, 1948 volume, "Foreign Commerce Year-Book." The Commerce Dept. has resumed annual publication. New volume contains foreign trade statistics and related economic and financial data for 68 countries, based on highly condensed official data published by the

WILLIAMS PRECISION FREENESS TESTER

The Most Accurate Freeness Tester Ever Built

Operates on the Only Correct Principle of Freeness Testing. Automatic Timing with Electric Stop Clock which Measures Drainage Rate through a Wire, same as on Paper Machine.

For 25 years we have developed and manufactured Pulp and Paper Testing Equipment

Pulp Testing Ovens
Sheet Moulds
Laboratory Presses
Sheet Dryers
Wood Chip Classifiers
Pebble Mills
A.S.T.M. Penetration Testers
Electric Centrifuges
Paper Moisture Testers
Smoothness Testers
Laminating and Plastic Moulding Presses

WILLIAMS APPARATUS CO., Inc.

19 Park Place — Watertown, N. Y.

respective areas, information supplied by the U. S. Foreign Service and other U. S. government sources. The last previous volume carried these figures through 1939.

McGraw-Hill Book Co. Book, 302 pp., 6 x 9, illustrated, price $3.75, "Farm Wood Crops." Provides specific instructions for appraising wood, for getting the greatest value from wood products and for building up a steady market for forest crops. Explains first steps in management of a woodland; gives full details on prevention of injury from overgrazing, fire, improper cutting, etc.; outlines best methods of maintaining soil fertility and crown cover; shows how to secure maximum natural reproduction and follow a time-saving cutting schedule.

The Master Builders Co. Bulletin, "Masterquick Method." Contains complete directions with illustrations for fast patching or resurfacing of worn concrete floors.

Associated Factory Mutual Fire Insurance Cos. "Factory Mutual Record," July 1950. Features fire safety in paint spraying in fuel that is labeled paint. Suggested details of location, arrangement, operation, and fire protection are contained in a new bulletin, "Paint Spraying, No. 13.30."

B. F. Goodrich Co. Catalog 3100, "Hose Couplings and Fittings." Pictures and gives details on each type coupling and fitting, with specifications, general and maximum pressure recommendations and a description of threads.

National Foreign Trade Council, Inc. Book, 161 pp., "Position of the National Foreign Trade Council with Respect to the Havana Charter for an International Trade Organization." Contains a statement of opposition to U. S. adherence to the Havana Charter for an International Trade Organization, with analysis of the Charter and relevant proposals of United Nations agencies and officials respecting economic development. These views were presented to the Committee on Foreign Affairs of the House of Representatives during a hearing on the Havana Charter in Washington, April 27, by Robert F. Loree, chairman of the National Foreign Trade Council. Among continuing major issues of international economic policy covered in the NFTC study and statement are (1) Employment and Economic Activity; (2) Economic Development and Reconstruction; (3) Tariffs, Preferences, Quantitative Restrictions and Exchange Arrangements, Subsidies, State Trading, Anti-Dumping and Countervailing Duties, and Valuation for Customs Purposes; (4) Restrictive Business Practices; (5) Inter-Governmental Commodity Agreements; and (6) Functional and Administration Features of an ITO as Proposed in the Havana Charter.

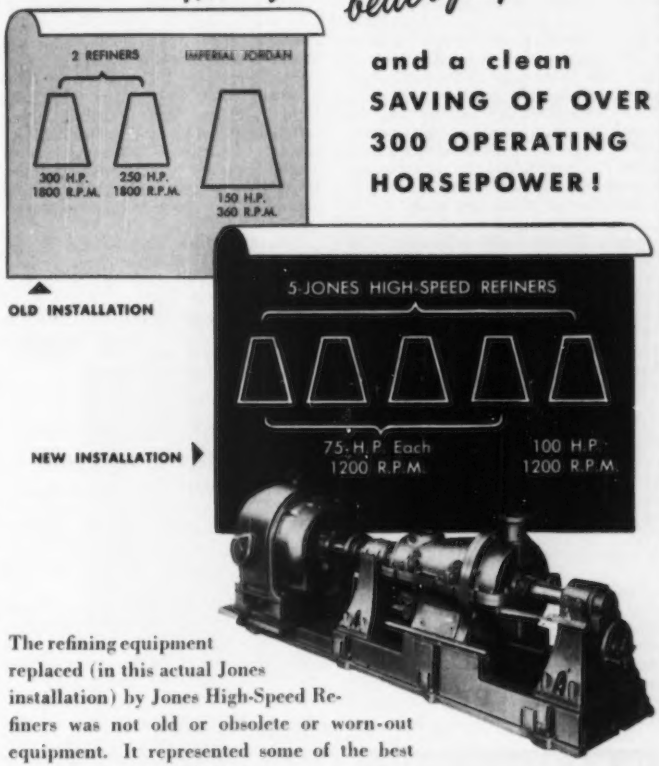
Reliance Electric & Engineering Co. Bulletin C-2001, ""D-C Motors." Features design, construction, selection, and ordering information, together with frame dimensions, for Type "T" Heavy Duty, constant and adjustable speed motors.

Terry Steam Turbine Co. Bulletin S-146, "The Terry Multistage Turbine." Gives data on all the parts that make up the turbine such as the casing, lagging, blades, etc., and is illustrated with photos and drawings.

The Atlas Mineral Products Co. General Bulletin MCC No. 1. Briefly describes Atlas' complete line of chemical construction materials including corrosion-proof linings, cements, brick sheathings, protective coatings and floors and acid-proof brick and tile. Includes handy estimating data.

Allis-Chalmers Mfg. Co. Bulletin 02B7301, 56 pp., illustrated, "Hydraulic Turbines and Auxiliaries." Describes the design and construction of Francis, propeller and impulse type, hydraulic turbines; and such auxiliaries as pressure regulators, special high head valves, butterfly valves and cabinet

Better Control More flexibility better preparation



and a clean SAVING OF OVER 300 OPERATING HORSEPOWER!

The refining equipment replaced (in this actual Jones installation) by Jones High-Speed Refiners was not old or obsolete or worn-out equipment. It represented some of the best current competitive thinking.

Yet Jones High-Speed Refiners actually produced improved stock — at a saving of over 300 operating horsepower. They save on maintenance cost, too.

For more information, write for Bulletin EDJ-1011-A.

E. D. Jones & Sons Company, Pittsfield, Mass.

BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

type governors for large units. Shows installations and has section devoted to manufacturing and testing facilities at Allis-Chalmers.

National Safety Council. Training film, 35 mm sound slidefilm, 16 mm film for sound-motion projectors, "Freight Handling Safety." Shows through a character called "Happy Jack" the safe way to open a freight car door, lower a dock plate into position and anchor it, and how to handle "sleepers."

Newsprint Assn. of Canada. Booklet, "Newsprint Supply." Answers the questions: (1) Will contracts with U. S. publishers and jobbers be honored before overseas commitments which may now be in abeyance are reinstated? (2) What immediate plans have the Canadian mills made to take care of both the increased newsprint demand which has developed this year in the United States, and the probable return of some of the overseas market in the second half of 1950 and in 1951? (3) What long range plans have the Canadian mills made to take care of the increased demand due to the growth in population and the aggressive selling of advertising by newspapers? Gives additional information on capacity expansion, production performance and prices and costs.

Oakite Products, Inc. Booklet, Vol. XXXIV, Nos. 5-6, "Oakite News Service." Contains articles: "Scientific Radiator Repairs Pay Off"; "Deburring and Burnishing — Two Modern Finishing Techniques"; "Clean Tubes Mean Efficient Operation of Heat Exchange Equipment"; "Oakite Sanitation Consultants."

Allis-Chalmers Mfg. Co. Bulletin 07B6419A, "Basic Industries Research & Testing Facilities." Illustrates and describes how A-C testing facilities are used in pulp and other processing fields. Carries a cross section of laboratory investigations conducted and of industries served.

Dominion Engineering Co., Ltd. Bulletin No. 370-1-49, "Dominion Gearmotors." Gives a description of all parts; classification, application and selection tables; outline dimensions, horsepower ratings and parts lists. Bulletin No. B-364-49, "Dominion Gearflex Couplings." Contains descriptions, maintenance and lubrication information, installation procedures, dimentions, horsepower ratings, selection and ordering information. "Dominion Engineer," Vol. XVI, No. 12. Features: "Canada's Titanium Ore Development."

American Cyanamid Co. Bulletin, "Quality Advantages Gained with Alwax and Waxine Sizes—A Survey of Treated Paper." Lists some 185 grades of paper or paperboard which profit in one manner or other by use of these products. Gives recommended sizes, point applied and results obtained.

International Brotherhood of Paper Makers. "Paper Maker's Journal," Vol. 49, No. 2. Highlights "Making Paper at Provincial"; "Contract Negotiations Analyzed"; "Labor Agreements Amended."

Minneapolis-Honeywell Regulator Co. Vol. 4, No. 5, "Instrumentation." Features "New Approach to Industrial Waste Treatment—Controlled pH Flotation Principles Exemplified by Use in Soap Plant and Paper Mill," by Fred S. Gibbs. Text illustrated with actual installations and schematic diagrams. "Continuous Measurement of Size Viscosity." Explains the new Measuring System, its installation and operation and the advantages offered.

Hewitt-Robins, Inc. Bulletin No. H-1, "Flexible Rubber Pipe." Discusses the applications and comparative qualities of flexible rubber pipe as against metal pipe in many services, exclusive of long lines. Includes progressive picture story, case histories and recommended applications.

THE H. K. FERGUSON COMPANY
PAPER MILL ENGINEERS & BUILDERS
Complete Service for Design, Construction, Equipment Installation, Engineering Reports and Surveys
Executive Offices
Ferguson Building, Cleveland
District Offices
19 Rector St., New York. M & M Bldg., Houston. 120 S. La Salle St., Chicago. 2975 San Fernando Road, Los Angeles. 21 E. 12th St., Cincinnati.

FORESTRY NEWS

Minnesota Joins Tree Farm System

WASHINGTON, D. C. — With the certification of 76 well-managed and privately owned forest areas totaling 4,199 acres, Minnesota became the nation's twenty-eighth Tree Farm state on June 17.

The Tree Farm program in Minnesota is sponsored by the Department of Conservation in cooperation with Minnesota Forest Industries and Keep Minnesota Green.

Hugh D. Bennett, executive secretary of KMG and secretary of the Minnesota Tree Farm System, hailed the program as the start of a revival in timber production in the North Star State. Mr. Bennett said Minnesota's 76 new Tree Farms will serve as demonstration areas where land owners can get the latest techniques and information on how to grow trees successfully as a cash crop.

Minnesota's Tree Farms range from 10 to 1300 acres in size. Each property has been carefully inspected by the sponsoring agencies. In every case the owners have demonstrated an ability to manage their woodlands wisely so that they will produce continuing crops of useful products.

Sponsors of the Tree Farm program say the productivity of Minnesota's more than 17-million acres of forest land can be increased two or three fold by proper management. At least 50,000 Minnesota residents are regularly employed in logging and wood processing businesses.

Minnesota is the third Lake State to enter the American Tree Farm System. Michigan and Wisconsin together have 215 Tree Farms with a total certified acreage of 1,175,000. The addition of Minnesota brings the total national Tree Farm acreage up to 20,853,000.

Two-Way FM Radio For Lookouts

LANSING, Mich.—The installation of the first two-way FM radio units in Baraga district forest fire lookout towers has been started, according to an announcement by the conservation department June 20.

All 140 Michigan towers will be converted from AM radio service as fast as new equipment is received. Following Baraga district installations will be those in Crystal Falls, Marquette and Newberry districts.

Improved radio communications will connect towers with other lookout posts, with regional and district headquarters, and with law enforcement and forest fire service mobile units.

OBITUARIES

SAMUEL FOSTER

Samuel Foster, chief engineer of the Kalamazoo Vegetable Parchment Co., Parchment, Mich., died on July 2. He was connected with the paper industry for 40 years. Before coming to Kalamazoo in July, 1944, he was connected

AMERICAN PAPER AND PULP ASSOCIATION'S PAPER PRODUCTION RATIO REPORT

(Production as percent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

	June 3	June 10	June 17	June 24	July 1
1950	97.8	102.0	102.5	‡104.5	‡104.5
1949	*78.6*	*82.3*	*78.1*	*77.0*	*77.5*

	June 4	June 11	June 18	June 25	July 2
1949	*78.6*	*82.3*	*78.1*	*77.0*	*77.5*

‡ Revised.

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1950	98.7‡	101.1‡	102.6‡	100.9‡	101.8‡	103.3‡							
1949	*94.6*	*92.8*	*89.1*	*85.1*	*82.7*	*78.6*	*72.8*	*87.6*	*89.7*	*96.0*	*98.2*	*90.4‡*	*88.0‡*

‡ Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1943	1944	1945	1946	1947	1948	1949	1950
Year to Date	88.8	88.6	88.9	100.4	105.5	99.8	87.5	101.4
Year Average	87.8	88.1	89.4	100.1	104.3	96.2	88.6‡	

PAPERBOARD OPERATING RATIOS†

	June 3	June 10	June 17	June 24	July 1
1950	85	94	93	94	94
1949	*65*	*79*	*78*	*80*	*75*

	June 4	June 11	June 18	June 25	July 2
1949	*65*	*79*	*78*	*80*	*75*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1950	88	92	91	92	91	94							
1949	*88*	*85*	*79*	*79*	*78*	*75*	*64*	*86*	*87*	*94*	*93*	*83*	*83*

* All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Charles Stahr Hamm, 53, of 49 Templar Way, Hanover, Pa., died July 2.

After a brief period with the New York & Pennsylvania Co. at their Johnsonburg, Pa., mill, Mr. Hacc came to the Mead Fibre Co., Kingsport, Tenn., now Kingsport Division of the Mead Corp., in January 1921 as superintendent of the pulp mill.

In 1928 when the Mead Paperboard Corp. was organized, he took over the operation of that development; and following the formation of the Mead Corp. in 1930, continued to supervise the paperboard operation, keeping abreast of developments and progress in the corrugated box industry.

In December 1945, Mr. Hamm resigned from the Mead Corp. to accept a position in the engineering department of Congoleum-Nairn Inc. of Kearny, N. J., where he supervised the expansion of their felt mill at Cedarhurst, Md., which doubled its capacity. Upon completion of that project, he took over the supervision of the engineering division.

Mr. Hamm is survived by his widow, Emily E. Hamm; his daughter, Ann; and three sisters, Mrs. C. N. Myers, Mrs. Elizabeth Slagle and Mrs. L. W. Pfaff.

Frank O. Hartwell, *72*, former president and chairman of the board of the Holyoke Card and Paper Co., Springfield, Mass., died July 6 in Washington, N. H.

with International Paper Co., Union Bag and Paper Corp. and the Sandy Hill Iron and Brass Works.

As chief engineer of KVP he helped guide some of their most ambitious engineering projects. The most outstanding was the establishment of the Espanola Mill. He also worked on the plant for Appleford Paper Products, Ltd., Hamilton, Ontario.

Three of his sons are connected with the paper industry. Arthur is a paper machine engineer for the Southern Kraft Div. of International Paper Co. in Mobile, Ala. Sam Lattimore is plant engineer in the same mill and Paul is in the mill accounting section of KVP Co., Ltd.

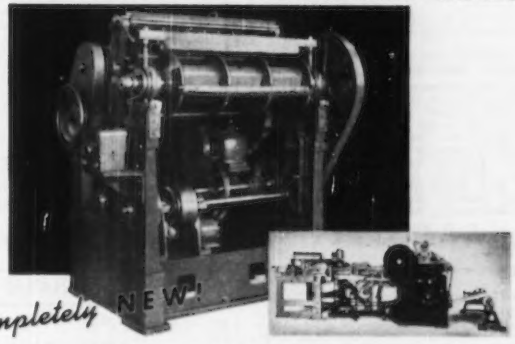
In addition to his three sons, he is survived by his widow, the former Elma Adelaide Poe, and two daughters, Adelaide and Vivian.

Lloyd Kitchel, *52*, a member of the board of directors of the Hercules Powder Co., Wilmington, Del., and general manager of the Virginia cellulose department, died in the Chestnut Hill, Pa., hospital on the evening of June 30 from a cerebral hemorrhage.

He was named general manager of the department and became a director of Hercules in 1937.

Surviving are his widow, the former Helen R. Weeks; a daughter, Mrs. S. McGill Gawthrop; two sons, William Lloyd Kitchel II and Robert Weeks Kitchel, and four grandchildren.

FOR SPOT CUTTING PRE-PRINTED ROLLS



SMITH & WINCHESTER

ROTARY SPOT CUTTER

For precision register and accurate spot cutting of pre-printed traveling webs at a high rate of production. This high speed rotary cutter can be equipped with photo-electric compensator or may be manually controlled. Save time, eliminate waste and increase production with this modern S & W equipment. Built in 40", 50", 60", 71" and 83" widths. May be furnished with lay boy and stacker as illustrated. *Write for detailed information!*

THE SMITH & WINCHESTER MFG. CO.
SOUTH WINDHAM, CONNECTICUT
Paper and Paper Bag Machinery Since 1828

CLEARING HOUSE

HELP WANTED

MEN WANTED
POSITIONS OPEN

We can place assistant manager pulp mill; assistant superintendent pulp mill; personnel director; supervisory electrical engineer; master mechanics and plant engineers.

Asst. supt. kraft paper mill; corrugated container plant supt. and foremen; wax process chemical engineer-chemist.

Cylinder machine foreman high-grade box board; bleaching foreman; chemists and chemical engineers; salesman with chemical engineering education and selling experience to sell mechanical equipment; machine tenders; back tenders.

We invite correspondence (confidential) with executives seeking positions and with employers seeking new personnel.

CHARLES P. RAYMOND SERVICE, INC.
294 Washington Street, Boston, Mass.
J-13

WANTED—EXPERIENCED & CAPABLE SALESMAN
In California by western bag manufacturer. Preferably with multiwall paper bag experience. Excellent future for man with executive ability. State age, education, references, experience, salary, present employment. All replies strictly confidential. Box No. 50-338 care Paper Trade Journal.
J-20

WANTED

Machine Tenders & Back Tenders for Cylinder Machine. Making Folding Grades. Also Third Hands, only experienced men need apply. Address Box 50-328 care Paper Trade Journal. J-20

SALARIED POSITIONS $3,500—$25,000
If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (40 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.
R. W. BIXBY, INC.
117 Dun Bldg., Buffalo 2, N. Y.
TF

CHEMIST—Prefer a man with five or more years industrial, laboratory and practical experience. Must have knowledge of resins, resin analysis, functional properties and their application to paper products. Salary commensurate with capabilities. Address Box 50-325 care Paper Trade Journal. J-13

OPERATOR & SUPERVISOR, Hamblet Sheeter, Seybold Cutter, Cameron Slitter. Small plant—Brooklyn. Send full details. Address Box 50-337 care Paper Trade Journal. J-20

HELP WANTED

PERSONNEL SERVICE ASSOC.
115 State Street, Springfield 3, Mass.
Specialized Confidential Placement Service
For the Paper and Allied Industries
Administration—Production—Technical—Sales
Men and Positions always available
Inquiries welcome. J-27

EXPERIENCED MAN as Manager of a long established dual house. Valuable mill connections. Mid-Atlantic States. Reply with full details. Our employees know of this advertisement. Address Box 50-323 care Paper Trade Journal. J-13

WANTED—Finishing Room Boss to take charge entire fine paper department large fine paper mill. Must have very best of experience. Job open immediately. Address Box 50-335 care Paper Trade Journal. J-13

SITUATIONS WANTED

ENGINEER AND OPERATOR with years of experience, wants to contact mills wanting to improve manufacturing and quality of products.

Address Box 50-344 care Paper Trade Journal. A-17

Research Director—20 years experience in peace and wartime Research, Production, Manufacturing, paper converting, synthetic coatings, adhesives, decorative, ordnance, functional, building, industrial, anticorrosive papers, foodwraps, imagination, know how, initiative, products, processes seeking new responsibilities with well established company in Research Management. Address Box 50-341 care Paper Trade Journal. J-13

SUPERINTENDENT OF PAPER BAG PLANT desires change. 18 years experience. Capable adjuster and machinist. Know printing. Successful record in management. Address Box 50-313 care Paper Trade Journal. J-20

FOR SALE

FOR SALE

4 Yankee Machines.
2 Fourdriniers, trimming 81 and 91", and 2 cylinders trimming 90 and 99" respectively.
Can be seen in operation on cellulose wadding and facial tissue.
For further particulars address Box 50-343 care Paper Trade Journal. J-13

FOR SALE

MODERNIZE YOUR PAPER MACHINES WITH ENCLOSED DRIVES.

FOR SALE

FALK MOTOR REDUCERS

Motor driven Falk Drives with 90 KW Generator, convertor set and panel control.

1—7½ h.p. 45-1 connected to DC motor.
2—5 h.p. 63-1 connected to DC motor.
2—7½ h.p. 23.4-1 connected to DC motor.
2—15 h.p. 38.6-1 connected to DC motor.

FALK HERRINGBONE DOUBLE REDUCTION PAPER MACHINE DRIVES.

4—Right Angle, ratio 6.31, h.p. 48 to 110 depending on input speed.
1—Right Angle, ratio 7.14, h.p. 129 to 276 depending on input speed.
1—Straight Drive, ratio 3.12, h.p. 150.
1—Straight Drive, ratio 1.97, h.p. 250.

ROSS PAPER MACHINERY COMPANY
265 Passaic Street Newark, N. J.
Tel. HUmbolt 2-2177 J-13

TISSUE PAPER MILL

For Sale—Located in the eastern section of country. Modern fireproof construction brick and steel. New steam plant. Substantial waterpower and land for expansion. Complete organization currently operating. Capable of producing toilet, napkin, waxing, twisting, interleaving, salesbook, impregnating tissue in rolls and antitarnish, wrapping tissue and specialty sheets. Up-to-date equipment. Excellent trade connections. Available at fraction of depreciated value. American appraisal. Principals only, no brokers. Box No. 50-312 care Paper Trade Journal. J-13

FOR SALE

Excellent site for a paper mill

on the Millers River at South Royalston, Massachusetts, seven miles east of Athol; includes power dam, water wheels and pump attached to 305 ft. artesian well, factory foundations and factory chimney; opportunity for a railroad siding Fitchburg division Boston & Maine Railroad. The only industrial site in a small community in a paper making area."

PARKER B. KIMBALL
Phone Athol 123, Athol, Mass. J-13

CHESTNUT WET LAP FOR SALE

8 Air Dry Tons per day of pure chestnut wet lap 60% air-dry. Available for immediate shipment. Write for details and sample.

CHAS. A. SCHIEREN COMPANY
Bristol, Virginia J-13

RATES FOR CLASSIFIED ADVERTISING

HELP WANTED—10c a word. Double rate for heavy face type. Minimum charge $2.50.

SITUATIONS WANTED—10c a word, double rate for heavy face type. Minimum charge $2.50. If repeated ½ rate will be charged for each consecutive repetition.

FOR SALE—10c a word. Double rate for heavy face type. Minimum charge $2.50.

WANTED—10c a word. Double rate for heavy face type. Minimum charge $2.50.

OPPORTUNITIES—10c a word. Double rate for heavy face type. Minimum charge $2.50.

Classified advertising space may also be purchased at $5.00 per single column inch. All classified advertisements are payable in advance. If box number is used—70 cents additional.

Address replies to advertisements appearing under Box Numbers in care of PAPER TRADE JOURNAL, 15 West 47th Street, New York 19, N. Y.

FOR SALE

1—112" Cameron, Type 18, 40" rewind.
1—72" Cameron, Type 10-11 (Late type)

BEATERS
1—500 lb. Beater—iron tub.
1—Dilts Iron Tub Laboratory Beater. Beater roll 14" diameter x 10¼" face, including motor.

CALENDER STACKS
1—72" 5 roll Calendar Stack.
1—2 roll pressure calender—32" x 108".

CHIPPER
1—96" Murray 4 knife Chipper—anti-friction bearings.

CRUSHER & HAMMERMILL
1—Murray Chip Crusher.
1—Jeffrey Hammermill.

CYLINDER MOLDS
1—36" diameter x 80" face.
1—30" diameter x 72" face.
1—36" diameter x 79" face.
1—48" diameter x 84" face.
1—36" diameter x 88" face.
1—36" x 68" face.
2—36" diameter x 54" face.

DECKERS
3—IMPCO 75¼" face x 30" diameter cylinder mold.

DRIVES
2—75 h.p. drives.
1—#4 Reeves Drives.
1—#2 Reeves Drive.
1—#5 Reeves drive.

V-BELT DRIVE
1—21¼" diameter x 7¼" face, 5 groove.
1—18½" diameter x 7¼" face, 5 groove. (With clutch).

DRYERS
2—42" diameter x 74" face.
7—24" diameter x 48" face.
4—36" diameter x 72½" face, with gears and bearings.
1—48" diameter x 91" face.
1—36" x 143".
1—24" x 130".
3—36" diameter x 96½" face.
1—48" diameter x 70" face.
2—48" diameter x 92" face.
1—48" diameter x 82" face.
2—36" diameter x 76" face.
23—36" diameter x 70" face—complete.
7—48" diameter x 112" face.

EMBOSSER
1—84" Hudson Sharp Toilet Embosser. Spare engraved roll.

FELT CONDITIONER
1—146" Nash Felt Conditioner.

FLAT SCREENS
1—6 plate Shartle Flat Screen.

FRAMES
2—Deck Frames for 8 Dryers, 48" diameter. Vertical frames for 100 dryers, 48" diameter, with bearings.

JORDANS
2—Noble & Wood Mammoth Junior.
1—Noble & Wood Mammoth Senior.
1—Emerson Jordan—25 to 30 tons capacity—iron plug including new spare iron plug.

LABORATORY EQUIPMENT
1—3' Shartle Hydrapulper, with motor.

LIME SLUDGE FILTERS
2—IMPCO Lime Sludge Filters, vacuum type, 5' diameter x 4' face.

MISCELLANEOUS
1—Caustic Mixer.

MOTORS
Write us regarding your requirements.

PRESSES
3—Sets Primary Presses, complete, 145" face. Anti-friction bearings. Also all types of rolls for 145" wet end.

PULLEYS
Various cone and assorted pulleys.

PULP BALER
1—140 ton hydraulic Pulp Baler. (Practically new).

PULPERS
1—Jones Pulper. Complete with motor and drive.
1—Noble & Wood Pulper—Iron Tub.

PULP PRESSES
2—Pulp Presses 76" wide (Kamyr Type).

PUMPS
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.

REELS
1—146" Pope Reel.
1—104" two bowl reel.
1—72" Beloit Reel.

ROLLS
Felt, Table, Press, Breast, Couch, etc. Various sizes and types. (Bronze, Rubber, Iron, etc.)

ROTARY SCREENS
1—#2 Bird Rotary Screen.
1—#2A Bird Rotary Screen.

SHEETERS
1—136" Moore & White Sheeter, duplex, with layboy.
2—36" Sheeters.
2—46" Sheeters.
2—50" Sheeters.
1—82" Clark Sheeter (Simplex.)

SLITTERS AND WINDERS
1—84" Cameron—Type 8-10.
1—72" Cameron—Type 10-11 (Late type).
1—50" Cameron—Type 34-2L.
1—42" Cameron—Type 40-4-B.
3—42" Cameron—Type 24-2-A.
1—42" Cameron—Type 9-5.
1—42" Cameron Constant Tension with pneumatic control.
1—115" 2 drum Waldron
2—112" Cameron Type 18.

STOCK PUMPS
1—10 x 20 Shartle Duplex.
1—7 x 16 Shartle Duplex.
4—7 x 16 Shartle Triplex.
1—10 x 20 Shartle Triplex.
2— 8 x 18 Shartle Duplex.
Advise as to your requirements.

SUCTION BOXES
5—Suction Boxes, 82" drilled face x 6" wide.

SUCTION COUCH ROLL
1—Sandusky 14-⅞" dia. x 103" drilled face.

VACUUM PUMPS
1—#1 Nash Hytor.
1—#3 Nash Hytor.
1—#6 Nash Hytor.

VAT
1—Iron end Vat only, for decker or savealL suitable for cylinder mold 36 x 130.

WASHERS
1—3 cylinder Washer 30" diameter x 75" cylinder mould.

WAXING MACHINES
1—72" Mayer Waxer.
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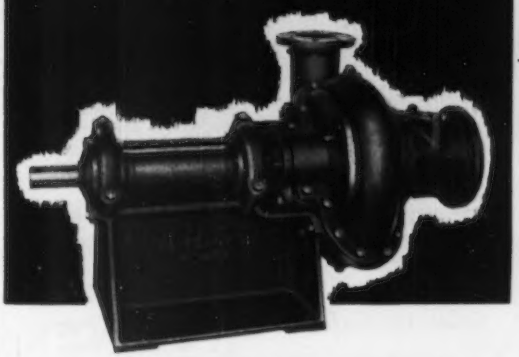

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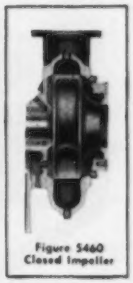

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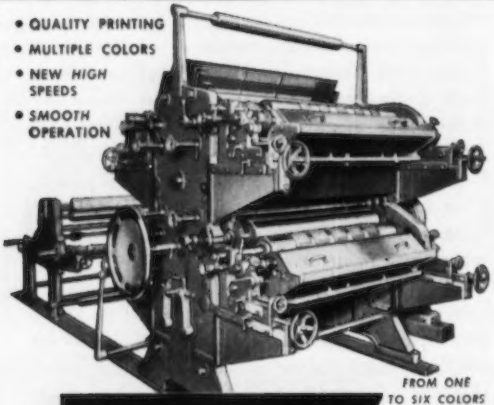

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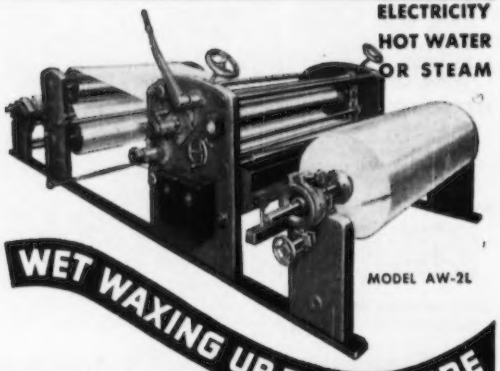

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Lukenweld
The Moore & White Co.
Murray Mfg. Co., D. J.
J. J. Ross Company
Red-Ray Mfg. Co., Inc.
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Farrel-Birmingham Co.
General Electric Company
Gibbs-Brower Company, Inc.
Rodney Hunt Machine Co.
Link Belt Company
Moore & White Co.
Murray, D. J., Mfg. Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

DRYER DRAINAGE
Stickle Steam Specialties Co.

DRYER ROLL PYROMETER
Thwing-Albert Instrument Co.

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
M. W. Jenkins Sons, Inc.
E. D. Jones & Son Co.
Moore & White Co.
D. J. Murray Mfg. Co.
John Waldron Corp.

DUSTING BRUSHES
M. W. Jenkins Sons, Inc.

DYESTUFFS
American Cyanamid Company, Calco Chemical Div.
Bunge Pulp & Paper Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuffs Corp.
National Aniline Division, Allied Chemical & Dye Corp.

ELECTRIC HYGROMETER
Thwing-Albert Instrument Co.

EMBOSSING MACHINES
Dilts Machine Works
John Waldron Corp.

EMBOSSING ROLLS
The Appleton Machine Co.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Northern Engraving & Mch. Co.
B. F. Perkins & Son, Inc.
John Waldron Corp.

EMULSIFIERS
General Dyestuff Corp.
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp.

ENZYMES
Rohm & Haas Co.
Vanderbilt Co., R. T.

EVAPORATORS
Davis Engrg. Corp.
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

EXPANDERS
Mount Hope Machinery Co.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Hardinge Company, Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
The Permutit Company

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Shuler & Benninghofen
Waterbury Felt Co.
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Nopco Chemical Co.

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Bird Machine Co.
The Sandy Hill Iron & Brass Works

FELT GUIDES
Black Clawson Company
Frank W. Egan & Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
American Cyanamid Company, Industrial Chemicals Division
A. M. Meincke & Son, Inc.
Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

FILTERS
Bird Machine Company
Hardinge Company, Inc.
J. M. Huber Corp.
Hungerford & Terry, Inc.
Johnson Corp.
Moore & White Co.
J. O. Ross Engrg. Corp.
The Sandy Hill Iron & Brass Works
Walworth Company

FITTINGS
Crane Company
Shartle Bros. Mch. Co.
Walworth Company

FLEXIBLE COUPLINGS
John Waldron Corp.

FLOORING, GRATING AND TREADS
The Goodyear Tire & Rubber Company
Norton Co.

FLOW BOXES, STAINLESS-CLAD
Lukens Steel Co.
The Sandy Hill Iron & Brass Works

FORK LIFT TRUCKS
Towmotor Corp.

FORMATION
Thwing-Albert Instrument Co.

FORMING MACHINES
Black Clawson Company
Downingtown Mfg. Co.
The Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

FREENESS TESTERS
Testing Machines, Inc.

GASKETS
The Goodyear Tire & Rubber Company

GEARS
Black Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Link Belt Company
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

GRINDERS
Bridgeport Safety Emery Wheel Company
Carthage Machine Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
Norton Company

GUIDES, WEB
The Moore & White Co.
Mount Hope Machinery Co.
Bound Brook Engrg. Co.
John Waldron Corp.

GUMMING MACHINES
Dilts Machine Works
The Sandy Hill Iron & Brass Works

GUMS
National Starch Products, Inc.
Stein-Hall Co., Inc.

HEADS
Babcock & Wilcox Co.
Lukens Steel Company

HEAT EXCHANGERS AND RECOVERY SYSTEMS
Davis Engrg. Corp.
Stickle Steam Specialties Co.
Westinghouse Electric Corp.

HEATING, VENTILATING & AIR CONDITIONING
The Appleton Machine Co.
Davis Engrg. Corp.
E. D. Jones & Sons Co.
General Electric Co.
Leeds & Northrup
D. J. Murray Mfg. Co.
Red-Ray Mfg. Co., Inc.
Ross Engineering Corp., J. O.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

HOSE (Air, Water, Suction, etc.)
The Goodyear Tire & Rubber Company

HUMECTANTS
Aktivin Division, Heyden Chemical Corp.
Nopco Chemical Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

IMPREGNANTS
American Cyanamid Company Industrial Chemicals Division
American Anode Div.

INDENTING MACHINES
Dilts Machine Works

INDUSTRIAL TRACTORS
Towmotor Corp.

INKOMETER
Thwing-Albert Instrument Co.

INSTRUMENTS, TESTING AND MEASURING
Bauer Brothers Co.
Bunge Pulp & Paper Co.
N. P. Bowsher
General Electric Company
W. & L. E. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Photovolt Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Thwing-Albert Instrument Co.

JOINTS
Johnson Corp.
Shartle Bros. Mch. Co.

JORDAN FILLINGS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Mch. Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
Heppenstall Company
E. D. Jones & Sons Co.
The Moore & White Co.
Taylor Stiles & Co.
Valley Iron Works Co.

KNOT BORING MACHINES
DeZurik Shower Company

KRAFT WRAPPING PAPERS
Canadian Newsprint Supply Co.

LABORATORY CORRUGATOR
Thwing-Albert Instrument Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
The Biggs Boiler Works Co.
Bird Machine Company
Dilts Machine Works
W. & L. E. Gurley
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories

WHERE TO BUY

Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works Co.
John Waldron Corp.

LAMINATING COMPOUND
National Wax Company

LAMINATING MACHINES
Dilts Machine Works
John Waldron Corp.

LAY BOYS
Dilts Machine Works
Gibbs-Brower Company, Inc.
Hamblet Machine Co.
Moore & White Co.

LUBRICANTS
Sinclair Refining Co.
Socony-Vacuum Oil Co.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

MAGAZINE REELS
Dilts Machine Works (Kohler Systems)

MATERIALS HANDLING
Cleveland Crane & Engrg. Co.
Dilts Machine Works
Industrial Brownhoist
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.
The Wellman Engrg. Co.

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Lobdell Co.
Testing Machines, Inc.

MICRO-CRYSTALLINE WAXES
Bunge Pulp & Paper Co.
National Wax Company

MOISTURE CONTENT CONTROL
Stickle Steam Specialties Co.

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Fairbanks, Morse & Co.
General Electric Company
Reliance Electric & Engrg. Co.

NEWSPRINT
Canadian Newsprint Supply Co.

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The International Nickel Co.

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Link Belt Company

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Johnson Corporation
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Shartle Brothers Machine Co.

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Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Lukenweld
Moore & White Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black Clawson Company
E. D. Jones & Sons Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPER TUBE MACHINERY
Dietz Machine Works
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson Sharp Machine Co.
Langston Co., Samuel M.

PARAFFINE WAXES
National Wax Company

PARAFFIN WAX EMULSIONS
Nopco Chemical Co.

PASTING MACHINES
Black Clawson Company
Dilts Machine Wks.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

PERFORATED METAL
Allis-Chalmers Mfg. Co.

PETROLATUMS
National Wax Company

pH METERS
Thwing-Albert Instrument Co.

PIGMENTS
Ferro Enamel Corp.

PIPE
Armco Drainage & Metal Products, Inc.
Babcock & Wilcox Co.
Crane Company
Michigan Steel Casting Co.
National Tube Co.
Walworth Company

PIPE FITTINGS
Armco Drainage & Metal Products Co.
Crane Company
Michigan Steel Casting Co.
Walworth Co.

PIPE MARKERS
W. H. Brady Co.

PITCH CONTROL
American Cyanamid Company Industrial Chemicals Division
General Dyestuff Corp.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.

PLASTICIZERS
American Cyanamid Company Industrial Chemicals Division
Aktivin Division, Heyden Chemical Corp.
Nopco Chemical Co.

PLATERS
Gibbs-Brower Company, Inc.
Perkins & Son, Inc., B. F.

PLATES
Armco Steel Corp.
Babcock & Wilcox Co.
J. O. Ross Engrg. Corp.
Lukenweld Division
Lukens Steel Company
Timken Roller Bearing Co.

PLUGS
The Appleton Machine Co.
Black Clawson Company
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

PRECISION SAMPLE CUTTER
Testing Machines, Inc.
Thwing-Albert Instrument Co.

PRESERVATIVES
E. I. du Pont de Nemours & Co.
General Dyestuff Corp.

PRESSURE VESSELS STEEL AND ALLOY
Babcock & Wilcox Co.

PRESSURE VESSELS
Chicago Bridge & Iron Co.

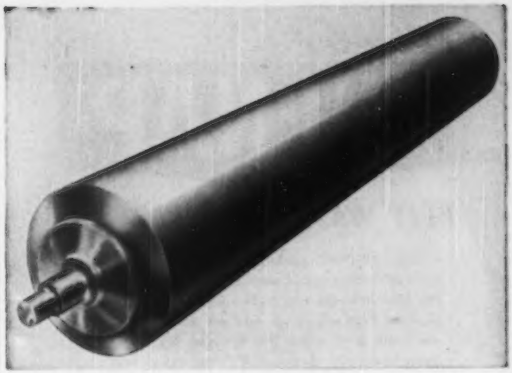
PRESSES
Black Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
The Moore & White Co.
Paper Converting Machine Co. Inc.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.
Waldron Corp., John
H. G. Weber & Co., Inc.
Williams Apparatus Co.

PULP CLASSIFIER
The Bauer Bros. Co.
Thwing-Albert Instrument Co.

PULP CLEANERS
Corp.
Nichols Engrg. & Research

PULP STOCK VALVES
Crane Company
Record Fdy. & Mach. Co.
Shartle Brothers Machine Co.

PULPERS
American Paper Machy. & Engrg Works, Inc.
Bauer Brothers Co.
Dilts Machine Works
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.



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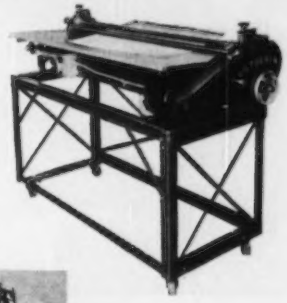

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Pulp and Paper Trading Co.
Pulp Sales Corp.
Restigouche Co., Ltd.

PULPSTONES
Norton Company

PUMPS
American Paper Machy. & Engrg. Works, Inc.
Allis-Chalmers Mfg. Co.
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DeLaval Steam Turbine Co.
Dorr Company
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Gibbs-Brower Company, Inc.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Roots Connersville Blower Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

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Red-Ray Mfg. Co., Inc.

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General Dyestuff Corp.
Rohm & Haas Co.

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B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

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Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones Corp.
Ross Engineering Corp., J. O.
Valley Iron Works Co.

REELS
The Appleton Machine Co.
Black Clawson Company
Dilts Machine Works (Kohler Systems)
Downingtown Mfg. Co.
Hudson Sharp Machine Co.
Moore & White Co.
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
Gibbs-Brower Company, Inc.
Anton J. Haug
E. D. Jones & Sons Co.
Morden Machines Co.
Murray, D. J., Mfg. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
American Paper Machy. & Engrg. Works, Inc.
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
DeZurik Shower Company
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies
Wallace & Tiernan

RESINS
American Cyanamid Company, Plastics & Resins Division
The Dow Chemical Company
The Goodyear Tire & Rubber Company
Hercules Powder Co.
Monsanto Chemical Company
Nopco Chemical Co.
Rohm & Haas Co., Resinous Products Div.

ROLLS
Appleton Machine Co.
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell Co.
The Moore & White Co.
D. J. Murray Mfg. Co.
Perkins, B. F., & Sons Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
U. S. Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Goodyear Tire & Rubber Company
Stowe-Woodward, Inc.

ROLL HANDLING EQUIPMENT
Dilts Machine Works (Kohler Systems)

ROLL STANDS
Cameron Machine Co.
Dilts Machine Works (Kohler Systems)
Frank W. Egan & Co.
Moore & White Co.
Potdevin Machine Co.
John Waldron Corp.
H. G. Weber & Co., Inc.
The Sandy Hill Iron & Brass Works

ROPE CARRIERS
Black Clawson Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works

ROTARY STEAM JOINTS
Johnson Corp.
The Moore & White Co.
Shartle Bros. Mch. Co.

RUBBER PRODUCTS
The Goodyear Tire & Rubber Company

SATURANTS
American Anode Div.

SATURATING MACHINES
Dilts Machine Works
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

SAVEALLS
Bird Machine Company
Chicago Bridge & Iron Co.
Green Bay Fdy. & Mch. Wks.
Hardinge Company

SCALES
Fairbanks, Morse & Co.
Merrick Scale Mfg. Co.
Testing Machines, Inc.

SCREEN PLATES
Bird Machine Company
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Testing Machines, Inc.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
E. D. Jones & Sons Co.
Link Belt Company

Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

SHEET MACHINES
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Valley Iron Works Co.

SHOWER PIPES
Bird Machine Company
DeZurik Shower Company
Downingtown Mfg. Co.
Moore & White Co.
Sandusky Fdy. & Mch. Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.
Gibbs-Brower Company, Inc.

SIZING
American Cyanamid Company, Industrial Chemicals Division
The Dow Chemical Company
du Pont, E. I., de Nemours & Co.
Hercules Powder Co.
The Hubinger Co.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Stein-Hall Co., Inc.
Wyandotte Chemicals Corp., Michigan Alkali Div.

SIZING TESTER
W. & L. E. Gurley
Testing Machines, Inc.
Thwing-Albert Instrument Co.

SLIME CONTROL
The Dow Chemical Company
E. I. du Pont de Nemours & Co.
General Dyestuff Corp.
Monsanto Chemical Co.
National Aluminate Corp.
Rohm & Haas Co.
Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

SLITTERS
Black Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Dilts Machine Works
Downingtown Mfg. Co.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Co.
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Dilts Machine Works

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Black Clawson Company
Dilts Machine Works
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Gibbs-Brower Company, Inc.
The Mayer Machine Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

WEB TENSION CONTROL
Dilts Machine Works (Kohler Systems)
John Waldron Corp.

WELDING EQUIPMENT
General Electric Company
Walworth Company

WET MACHINES
Black Clawson Company
Carthage Machine Co.
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
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Pusey & Jones Company
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

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General Dyestuff Corp.
Monsanto Chemical Company
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WHITE WATER HEATERS, AUTOMATIC SELF CLEANING TYPE
Davis Engineering Corp.

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The Dorr Company
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The Permutit Company
The Sandy Hill Iron & Brass Works

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The Appleton Machine Co.
Black Clawson Company
Cameron Machine Co.
Dietz Machine Works
Dilts Machine Works
Downingtown Mfg. Co.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson-Sharp Mach. Co.
Kohler Systems
Langston Co., Samuel M.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
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J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Waldron Corp., John

WINDING ROLL CHANGERS
Dilts Machine Works (Kohler Systems)

WIRE BRUSHES
M. W. Jenkins Sons, Inc.

WIRES
Appleton Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Williams-Gray Co.

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WOOD SPLITTERS
The Appleton Machine Co.
Carthage Machine Co.

INDEX TO ADVERTISERS

A

Alexander Brothers — —
Allis-Chalmers — —
Amercoat Corporation — —
American Cyanamid Co., Calco Chemicals Division — —
American Cyanamid Co., Industrial Chemicals Division — 23
American Drainage & Metal Products Co. — —
American Leather Belting Assn. — —
American Paper Mchy. & Engrg. Wks. — —
Appleton Machine Co., The — —
Appleton Wire Works, Inc. — —
Appleton Woolen Mills — 50
Armco Steel Corp. — —
Askania Regulator Co. — —
Asten-Hill Mfg. Co. — —

B

Babcock & Wilcox Co. — —
Bagley & Sewall Company — —
Bahr Bros. Mfg. Co. — —
Bailey Meter Company — —
Bauer Brothers Co., The — —
Bird Machine Company — 15
Birk, F. Paul — 54
Bixby, R. W., Inc. — —
Black-Clawson Company — —
Blaw-Knox Company — —
Bowsher, N. P., Company — —
Bridgeport Safety Emery Wheel Co. — —
Brown Company — —
Bulkley, Dunton Pulp Co. — —
Bunge Pulp & Paper Co. — —

C

Cambridge Instrument Co. — —
Cameron Machine Co. — —
Canadian Newsprint Supply Co. — —
Carthage Machine Co. — —
Chemipulp Process Inc. — —
Chicago Bridge & Iron Co. — 3
Chiksan Company — —
Ciba Company — —
Classified Advertising — —
Cleveland Crane & Engrg. Co. — —
Clinton Foods, Inc. — —
Cochrane Corporation — —
Colledge, E. W. — —
Columbia Chem. — 4
Combustion Engineering-Superheater, Inc. — —
Corn Products Sales Co. — —
Cowles Chemical Co. — 56
Crane Company — —
Crucible Steel Co. of America — 19
Curlator Corporation — —

D

Davis Engineering Corp. — —
Deitz Machine Works — —
De Laval Steam Turbine Co. — —
DeZurik Shower Co. — —
Dilts Machine Works — 8
Dorr Company, The — —
Dow Chemical Company — —
Dow Corning Corp. — —
Downingtown Mfg. Co. — 2
Draper Brothers Co. — —
duPont, E. I., de Nemours & Co., Electrochemical Dept. — —
duPont, E. I., de Nemours & Co., Dyestuffs Dept. — —
duPont, E. I., de Nemours & Co., Grasselli Chem. Dept. — —
duPont, E. I., de Nemours & Co., Polychemicals Dept. — —
Durkee Company, The — —

E

Ebasco Services, Inc. — 54
Efficiency Engrg. Co. — —
Egan, Frank & Company — —
Elixman Paper Core Co. — —
English China Clays Sales Corp. — —

F

Fairbanks Morse & Co. — 51
Farrel-Birmingham Co., Inc. — —
Ferguson, The H. K., Company — 44
Ferro Enamel Corp. — —
Fitchburg Screen Plate Co. — —

G

Grigy Company — 54
General Dyestuff Corp. — —
General Electric Company — —
Gibbs, Ralph E. — —
Gibbs-Brower Co. — —
Goodrich Chemical Company — 59
Goodyear Tire & Rubber Co. — —
Goslin-Birmingham Mfg. Co. — —
Gotham Ink & Color Co. — —
Gottesman & Company — Front Cover
Green Bay Fdy. & Wks. — 49
Grinnell Company, Inc. — —
Guest, C. M., & Sons — —
Gurley, W. & L. E. — 56

H

Hagan Corp., (Calgon, Inc.) — —
Hall, Thomas W., Co., Inc. — —
Hamblet Machine Co. — —
Hansson, Elof, Inc. — —
Hardinge Company, Inc. — —
Heppenstall Company — —
Hercules Powder Company — —
Heyden Chemical Co., Aktuvin Div. — —
Hooker Electrochemical Co. — —
Huber, J. M., Corp. — —
Hubinger Company, The — —
Hudson Sharp Mfg. Co. — 52
Hungerford & Terry, Inc. — —
Huyck, F. C., & Sons — —

I

Industrial Brownhoist — —
International Nickel Co. — —
International Wire Works — —

J

Jenkins, M. W., Sons, Inc. — —
Johnson Corporation, The — —
Johnson, Alvin H., & Co. — —
Jones, E. D., & Sons Co. — 43

K

Kalamazoo Tank & Silo Co. — —
Kidder, Peabody & Co. — —
Kinsley Chemical Co. — 50
Knox Woolen Company — 49

L

Langston, Samuel M., Co. — —
Lawton, C. A., Company — —
Leeds & Northrup Co. — —
Lindsay Wire Weaving Co. — —
Link Belt Company — —
Lobdell United Company — —
Lockport Felt Co. — —
Lodding Engineering Co. — —
Loeser, E. W., Company — —
Lukens Steel Company — 27
Lyddon Company — —
Lynch Corporation — —

M

Magnus Metal Div., Nat. Lead Co. — —
Main, Charles T., Inc. — 54
McBride, Edward J., Company — 55
Mead Sales Company, The — —
Meincke, A. M., & Son — —
Meisel Press Mfg. Co. — —
Merrick Scale Company — —
Michigan Steel Casting Co. — 50
Monsanto Chemical Company — —
Montague Machine Co. — —
Moore & Munger — —
Moore & White Co. — —
Moorhead Electrical Machinery Co. — —
Morden Machines Company — —
Morey Paper Mill Supply Co. — —
Morning, Nichol Inc. — —
Mount Hope Machinery Co. — —
Murray, D. J., Mfg. Co. — —

N

Nash Engineering Company — —
National Aluminate Corp. — —
National Aniline Div., Allied Chem. & Dye Corp. — —
National Starch Products, Inc. — —
National Technical Laboratories — —
National Wax Company — 50
Newport News Shipbuilding & Dry Dock Co. — —
Niagara Alkali Co. — 33
Nichols Engrg. & Research Co. — —
Nopco Chemical Co. — —
Northern Engraving & Mch. Co. — —
Norton Company — —

O

O'Donoghue, Roderick — 54

P

Paisley Products, Inc. — —
Paper & Industrial Appliances — —
Paper & Pulp Testing Laboratories — 54
Parsons & Whittemore — —
Perkins, B. F., & Son Co. — —
Perkins-Goodwin Company — —
Permutit Company, The — —
Photovolt Corporation — —
Pittsburgh Plate Glass Co. — —
Potdevin Machine Co. — 55
Powell, William, Company — —
Price & Pierce, Ltd. — 49
Pulp & Paper Trading Co. — —
Pusey & Jones Corp., The — —

R

Raymond, Chas. P., Service, Inc. — —
Record Fdy. & Machine Co. — 50
Red Ray Manufacturing Co., Inc. — —
Reichhold Chemicals, Inc. — —
Reliance Elec. & Engrg. Co. — —
Research Corporation — —
Restigouche Co., Ltd. — —
Rice Barton Research Corp. — —
Rogers, S. C., & Co. — —
Rohm & Haas Company — —
Roots-Connersville Blower Corp. — —
Ross, J. J., Company — 47
Ross, I. O., Engrg. Corp. — —
Ross Paper Machinery Co. — —
Rust Engineering Co. — 54

S

Sandusky Fdy. & Mch. Co. — —
Sandy Hill Iron & Brass Works — 50
Shartle Brothers Machine Co. — —
Shuler & Benninghofen — —
Sinclair Refining Co. — —
Sirrine, J. E., Company — —
Smith & Winchester Mfg. Co. — 45
Socony-Vacuum Oil Co., Inc. — Back Cover
Solvay Sales Div., Allied Chem. & Dye Corp. — 53
Sonoco Products Company — —
Stebbins Engrg. & Mfg. Co. — —
Stein, Hall & Co., Inc. — —
Stickle Steam Specialties Co. — —
Sun Oil Company — 6
Sutherland Refiner Corp. — —

T

Taylor Instrument Co.'s — —
Taylor Stiles & Co. — —
Testing Machines, Inc. — —
Texas Company, The — —
Texas Gulf Sulphur Co., Inc. — —
Thomas Flexible Coupling Co. — —
Thwing-Albert Instrument Co. — —
Tide Water Assoc. Oil Co. — 31
Timken Roller Bearing Co. — —
Titanium Pigment Corp. — —
Towmotor Corporation — —

U

United Carbon Co., Inc. — —
U. S. Rubber Company — —
U. S. Steel Corp. — —

V

Valley Iron Works Co. — —
Vanderbilt, R. T., Co., Inc. — —
Virginia Smelting Company — —

W

Waldron, John, Corporation — —
Wallerstein Co., Inc. — —
Walworth Company — —
Waterbury Felt Company — —
Waterbury, H., & Sons Co. — —
Weber, H. G., & Co., Inc. — —
Wellman Engineering Co. — —
Western Gear Works — —
Western Precipitation Corp. — 10
Westinghouse Electric Corp. — —
West Va. Pulp & Paper Co. — 49
Weyerhaeuser Timber Co. — —
Wheeler Roll Company — —
Whiting Corporation — —
Williams Apparatus Co. — 42
Williams Gray Company — —
Wyandotte Chemicals Corp. — —

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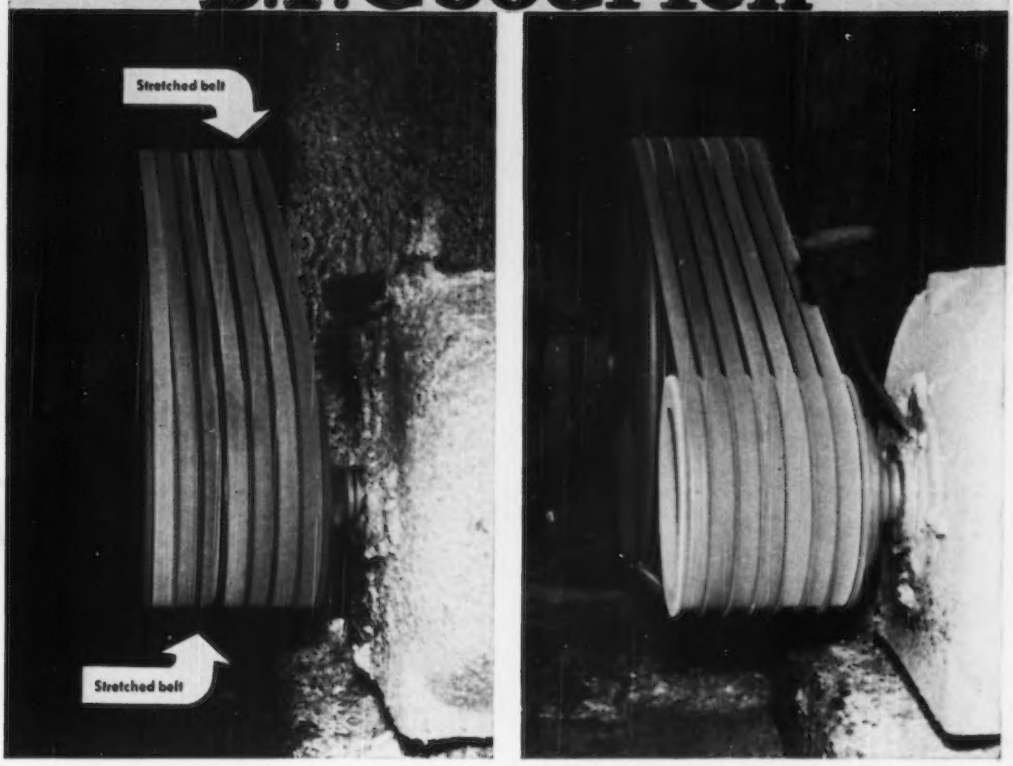

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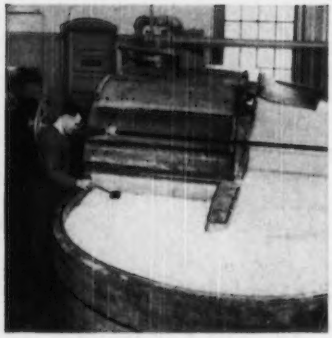

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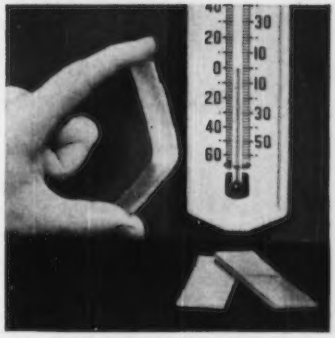

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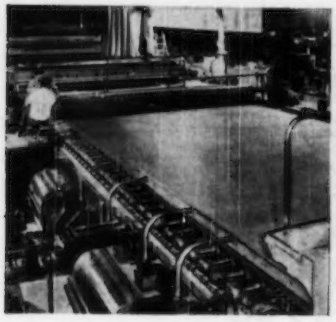

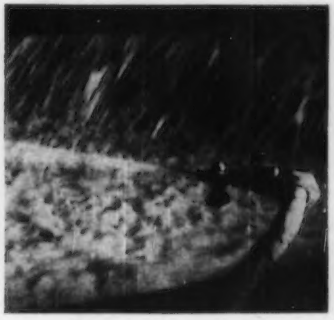

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